

GROUND WATER CONTAMINATION

HEARINGS
BEFORE THE
SUBCOMMITTEE ON TOXIC SUBSTANCES
AND ENVIRONMENTAL OVERSIGHT
AND THE
FULL COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
NINETY-EIGHTH CONGRESS
FIRST AND SECOND SESSIONS

NOVEMBER 21, 1983—BOZEMAN, MONTANA
NOVEMBER 29, 1983—WASHINGTON, D.C.
JANUARY 18, 1984—ROCHESTER, MINNESOTA
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GROUND WATER CONTAMINATION

MONDAY, NOVEMBER 21, 1983

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON TOXIC SUBSTANCES
AND ENVIRONMENTAL OVERSIGHT,
Bozeman, Mont.

The subcommittee met at 9:30 a.m., in the Bozeman City Library, Bozeman, Mont., Hon. Max Baucus presiding.

OPENING STATEMENT OF HON. MAX BAUCUS, U.S. SENATOR FROM THE STATE OF MONTANA

Senator BAUCUS. This hearing will come to order.

I want to first congratulate our witnesses and guests for turning out on a cold, snowy Monday morning.

The purpose of the hearing today has several goals: First, to try to, as much as possible here in our State of Montana, to get ahead of the ground water problem. Many States suffer from severe ground water difficulties. Their ground water is very heavily polluted by all kinds of sources. We are fortunate in our State not to have quite the same problems, certainly not to the same degree as most other States; States that are more heavily populated, therefore, more polluted. So we have an opportunity to get ahead of the problem, and I know that it might be somewhat wishful thinking to try to solve a problem before the crisis occurs. I think we can benefit from knowing about the problem in other States so that we Montanans can avoid them and stay ahead of the game as much as it is possible.

We all know that ground water is sort of an afterthought in all of the various Federal and State laws with respect to water. Here in the West there are laws with respect to surface water and who is entitled to surface water; that has been around for a long time. Lots of words have been spoken, lots of laws passed and lots of fur has flown over who gets surface water, and who doesn't.

So ground water really hasn't had quite the same attention as has surface water. But we see some of the problems affecting ground water, so again it is important for us to try to take advantage of problems that have occurred elsewhere and then try to figure out the best way to protect the ground water that we now have and perhaps get into the questions of use and allocation to the degree that that is appropriate.

It is a difficult problem because each area of the State is different from other areas; that is, the hydrogeological formations in the State

vary tremendously. They're very difficult to determine. Yet we all rely heavily on ground water. Over 50 percent of the urban areas depend upon it, and of course agriculture in Montana, the main economic underpinning of our State, relies almost entirely upon the ground water in one way or another.

Some of the problem evolves around fertilizers and runoff and non-point pollution problems. On the other hand, it's getting water for the stock and for irrigation. Unpolluted water for stock and for irrigation is very important.

So we are hoping that as the U.S. Congress begins more to focus on the ground water problem that this hearing today will help us determine, in a better way, what our Montana angle is, so that when Federal legislation is passed, we in Montana have a good hearing record; we're well armed to be sure that any Federal approach to this doesn't run roughshod over the Montana point of view.

This will not be the only ground water hearing. There will be numerous ground water hearings and there will be many, many efforts on the part of many people to get a better handle on it; to better define our situation here in Montana. It is my hope that by getting ahead of the congressional deliberations that we'll be in a better position to make sure the Western point of view is better represented in a final congressional solution. It very well may be we don't want much of a congressional solution, that it's more up to the State of Montana. It's up to the individual States to take the lion's share, the main part of the problem, but still because water does flow between States and because ground water also flows between States, there may be efforts on the part of others in the country to want a Federal solution. We in Montana don't have veto power over all these other States. And so if there is a Federal solution, we have to be better armed and have better information so that we can protect ourselves the best we possibly can.

I also want to acknowledge the efforts that have occurred in the State. I know the Governor has an advisory council on ground water, and I know that the council has been working diligently. We have members here today who will tell us what the State has been doing in the past, the problems the State sees, and more importantly, what the State is planning to do in the future. That is very welcome. So with all that, let me say thank you all for coming, and let's get on with the witnesses.

Our first witness will be Senator Dorothy Eck. Dorothy is the chairman of the subcommittee on water resource oversight. Representative Iverson was going to be here, but he's not going to make it today.

Dorothy, why don't you come on up?

STATEMENT OF HON. DOROTHY ECK, MONTANA STATE SENATOR

Senator Eck. Senator Baucus and interested citizens, I come to the hearing this morning to express the concerns and interests of the environmental quality council and its water committee and the Governor's advisory council on ground water, but not to officially speak for those groups.

The environmental council, the environmental quality council, is charged by law to develop and recommend policies to promote an improvement of environmental quality. That's a broad charge, and obviously one of our continuing concerns is for clean water.

The council during this interim period between legislative sessions is considering and may possibly propose legislation or come up with recommendations in a number of water-related matters, and most of these relate to ground water.

One is the disposal of toxic wastes. We have recognized that the proposed amendment of the Federal Resources Conservation and Recovery Act would provide us greater protection, and there has been a good bit of concern in Montana about the fact that really some rather substantial amounts of toxic wastes can be disposed of in our landfill dumps. It's been up to around 2,000 pounds a month. The new Federal legislation would cut that to 100 pounds a month, which would mean that there would be a great number of businesses, industries that would have toxic wastes to put into an approved disposal site.

We are assuming that the State would have a significant role in that. You know, it would be possible to put the responsibility solely on the small businesses and some large businesses involved, but I can't see that the State is likely to want to do that, which means that we are going to have, we are likely to have an expanded role in this area, and our council is watching that process and we have a subcommittee on toxic waste.

We are also concerned with the cleanup of designated and potential Superfund sites in Montana. We have all heard of the five sites that have been designated and where cleanup is underway, but our bureau of solid waste management is also looking at any other sites, so this is another area where we are involved, and more than anything else, the council is monitoring what is happening.

We have also heard a good deal about acid rain. We have council members that are especially concerned about this, recognizing that this is a problem that we see mostly in southwestern Montana, in high mountain lakes, but there is concern that it could threaten our whole tourist industry in western Montana and that early monitoring might give us some ideas of what we could do in that respect.

We are always concerned about ground-water pollution and are looking at pollution relative to mining and oil and gas exploration activities. We have heard for years, and I think this is a long-time concern of the Environmental Quality Council is what to do about those shot-holes and they should be plugged, and the industry has been quite cooperative in trying new methods, and those are being monitored. I don't think anyone on the council feels that the situation has been solved.

And finally we are concerned about a comprehensive data base for both ground and surface waters. I have been going to these kinds of hearings for a long time from my League of Women Voters days where the league has always had a strong water position. In almost every hearing people talk about the needs for that data base. Well, it's finally really getting started and we're concerned about this.

Last year, in the spring of 1982, the Environmental Quality Council sponsored a ground-water conference which I think was very produc-

tive. One of our recommendations at the close of that conference was that the Governor name a Groundwater Advisory Council. The Governor has done that. There is a 16-member council with representatives from the legislature, from State agencies, from some Federal agencies, and from the public. This council has started meeting, and I think that it promises to be very helpful in coming up with a strategy for managing our ground water.

On Friday, or on Saturday, we had a water conference for the Gallatin Valley, for Gallatin County really, and here, too, we found a great deal of interest and a feeling that we have to know what our resources are. We have to know what the data is in order to make the wind of decisions that should be made.

Both the Environmental Quality Council and the Groundwater Advisory Council have acknowledged that cooperation with Federal agencies and programs is necessary. While Montana has strong environmental laws and policies, we depend on Federal laws and programs for much of our basic environmental protection.

A concern basic to many issues is that of the rapidly declining Federal support for needed data gathering, analysis, monitoring, and enforcement activities. Each legislative session is faced with the unpopular necessity of picking up costs to make up for declining Federal support. Despite Montana's commitment to maintaining environmental quality, it has not been possible to increase appropriations enough to adequately provide for many needed activities.

Even as we go into the special session, we see some lacks of funding, you know, the possibility of a bureau having to close because there's not enough money there, and those of you who follow the legislature know how reluctant they are to fund Federal activities which have been cut back.

Montanans appreciate your effort in making sure that our voice is heard. We feel you really understand our problems, and especially when they are fiscal problems. We are especially appreciative of your efforts to stop the move that would have really required Montana to help support putting scrubbers, et cetera into midwestern and eastern powerplants in order to cut down on the acid rain that is being produced by those plants. We have those scrubbers in our plants, and we have paid for them through, or are paying through our rate base. We don't feel we should have to pay there, too. I hope that it will be possible to maintain and strengthen those Federal laws which protect our supply of clean water and to resist legislative or Executive actions which would erode these laws and their enforcement. I hope, too, that where the State is given added responsibilities, and it looks like that is happening, there will also be added Federal funding.

Thank you.

Senator BARCIS. Thank you, Dorothy. I have a couple of questions. I want to thank you very much for that last point about the need to make sure that any acid rain legislation must encourage midwest and eastern coal-fired generators to pay for their cleanup. We have already paid for ours. I don't know if everybody knows it but the State of Montana, Colstrip 3 and 4, will cost about \$1.4 billion and about \$500 million of that goes into environmental cleanup equipment to make sure that air pollution is kept to the minimum.

The fact of the matter is that Colstrip 3 and 4 will meet class I standards under the Clean Air Act, and those are extremely stringent. For example, there will be about 0.07 pound of sulphur dioxide per million Btu in Colstrips 3 and 4, and that is about 100 times cleaner than the emissions coming out of the Midwest and Eastern power-plants.

We've already paid for it, and we're paying for it in utility bills as everyone knows, and now it's important that you raise that point because the chairman of this subcommittee has introduced legislation for a flat tax that we have to pay for. So I'm glad that you made the point that we in the west don't want to make that payment. We shouldn't have to make it. We have paid for our cleanup. We have met high standards, and I frankly think Montana Power has done a good job in doing this. They have installed the equipment to meet class I standards under the Clean Air Act. It's absolutely wrong for there to be a 1-cent or 2-cent per kilowatt-hour tax nationwide if that goes into a fund and that fund is then used to pay for the cleanup costs in other parts of the country. We've already paid ours. Why should we have to pay additional tax passed on to consumers and higher utility bills when we've already cleaned up and they have not?

And, again, the chairman of this subcommittee has a bill, so I'm glad that you made this point so that he will know.

Senator ECK. I would say good luck to you on that.

Senator BAUCUS. Turning back to ground water, help me, Dorothy, if you could, and outline as best you can what the ground-water problems are in the State. I know we've got some arsenic problems around Three Forks and so forth, and certainly Milltown out of Missoula has very severe ground-water problems because of the tailings from Anaconda. It has come downstream into the Clark Fork and eventually affected Milltown just outside of Missoula.

Certainly as the underground mines of Butte start to fill up and maybe in the pit itself, I don't know what that's going to do to underground water in that part of the State.

Saline seep, of course, is a different kind of ground-water problem we're facing, so is fertilizer runoff. Can you identify what some of the problems are so we can take the next step as to what to do about it?

Senator ECK. I think these have been listed. I think that a lot of our problems are old problems associated with old mining works where there weren't any controls.

I think the saline seep one is probably one that is of most concern, and that's something we didn't hear about more than 10 years ago, and yet even since we have started taking action to alleviate those problems, that problem, and we know more about it, it's still gotten worse, and the reason is because that salinity is in the ground water, and one of the real key problems I think to ground water and knowing what's happening there is how slow it moves.

In other words, we might have some pollution entering the ground-water system today, and it might not show up for 50 years or 200, and for that reason we have to be very careful about what does go on.

Senator BAUCUS. What about here in the Gallatin Valley, outside the city limits of Bozeman? I don't know, but I'm wondering, farmers rely upon ground water so much.

Senator ECK. I think in the Gallatin Valley, from our conference the other day, there was some concern about pollution and there always is, and that was mostly relative to subdivisions and the feeling that it is polluting someone else's water supply, and I think there's good reason to be concerned about that, but I also think that we're looking at ground water as being an opportunity that we have a lot of ground water out there that we are not using well and if it could be managed well, there might be enough water for everyone. There might be enough water so that we don't have to let the Gallatin River run dry and a number of other streams and that when you look at this area as a tourism area, that has economic benefits, too.

The city of Bozeman is looking at the need for additional water, and it's a matter of do we have to go out and build a new dam? Or is there a possibility of making use of this ground water, and what are the economics of that?

In the Gallatin, I don't think that we're not looking at tremendous problems with ground water pollution so much as the need to really understand the whole system.

Senator BAUCUS. The reason I asked is I just noticed in yesterday's Chronicle, the statement Judge Lessley made about water, and let me just quote him. It has me a little alarmed.

He says here, I'm quoting Judge Lessley as quoted by the Chronicle:

You are going to see a wreck unless you get off your duffs and start planning in Gallatin County. Let's not wait around until a crisis. Let's not wait until a crisis comes because we are right around the corner now and facing pollution and all the rest. It's a tremendous problem, but it can be talked down.

What is he referring to—what's the crisis? I don't quite understand. I should have Judge Lessley here. I'm curious.

Senator ECK. We are talking about pollution. I think that there is, the crisis is probably related to subdivisions, and I have been concerned about this. I remember when they started building rural subdivisions 20 years ago or so and the talk was that we needed 3 acres per homesite in order to safely have a well and a septic tank.

Well, they're building them now on 1 acre. Some of those 1 acres are long, skinny 1 acres, so that the houses are right close together, and I think that there are a lot of people that are concerned about that, and I think that the judge lives close to one of those areas.

Also, there are real problems in the mixing of ground water and surface water. You dig a well, and the river runs dry and someone has the water rights, and of course that's basically what Judge Lessley is working with, is the water rights, and he's concerned about that.

Senator BAUCUS. He's such a water expert that when he says there's a crisis, I'll listen.

Senator ECK. Also, I know Judge Lessley well enough to know that he's inclined to speak rather forthrightly and put a little drama into a situation.

Senator BAUCUS. Nothing wrong with that.

OK. I know you have to leave, Dorothy. Just one real quick question. You know, the Columbia flows west, and the Missouri eastward, so are there any, as far as you know, any ground water seeps into Montana at all from anywhere that you're aware of?

Senator ECK. We have someplace, a little bit from Canada, and then of course there's the North Fork and the Flathead, but for the most part what happens in Montana is a little bit, what you have with water is a little bit what we're talking about with acid rain, which is what we've got is many small towns that have developed good water systems and extensive sewage treatment systems, and they put a lot of money in it. I mean, for many of those towns, the money that they spend for sewage treatment is their largest expense, and yet they do that really for the downstream communities and downstream States.

It doesn't make very much difference to our water quality. It hasn't really improved it very much by putting in those treatment systems, which means that Montana is really bearing a lot of the expense for clean water for downstream States.

Now when you talk about what other States are doing, I heard someone the other day talking about this great North Dakota joke, because their great joke is so far as knowing what they have in their ground water system, they know. They have done the work, and it's all in place, and they can make decisions knowing what the consequences will be better than we can, and we have kind of put it off.

I don't know how many times we've had good proposals to get this system going, and it's always fallen back because of money. I hope sometime that you would have an opportunity to see our water simulator.

Senator BAUCUS. I've seen it.

Senator ECK. Even though we had all of the data for Gallatin Valley to plug into that, it would also be a decisionmaking device.

Senator BAUCUS. Yes.

Senator ECK. That's the way we are going, and I think we have a lot of important decisions to make.

Senator BAUCUS. But there's no ground water in there.

Senator ECK. Yes there is.

Senator BAUCUS. They must have updated it.

Senator ECK. There is surface water and ground water in there, and I think that it would be, if we had real data instead of kind of outdated data, it could be very useful.

Senator BAUCUS. Dorothy, I appreciate very much your coming here and your help.

Our next witness is Doug Daniels, who is a consulting engineer with Three Forks. Is that right, Doug?

Mr. DANIELS. That's correct.

Senator BAUCUS. The mayor, Gene Townsend, was supposed to be here today. He's unable to make it, and Doug, you are going to pinch hit.

STATEMENT OF DOUG DANIELS, CONSULTING ENGINEER, THREE FORKS, MONT.

Mr. DANIELS. Thank you, Senator Baucus.

Just as some background, the city of Three Forks has problems with the arsenic level in their water supply. They rely on five different wells located within and adjacent to the city for their domestic water supply for the city.

They have been aware of arsenic levels in their ground water supply for as long as 20 years. However, during the last 10 to 15 years, the public safe drinking water laws have become more restrictive on the levels that are allowed for arsenic within public water supplies. And the other thing that has occurred is that they have had increase just from growth within the community in the amount of water that they consume.

They know that all of their wells contain arsenic. Two of their wells contain higher arsenic levels than the others. Unfortunately, they rely heavily on those two wells that have the high arsenic levels.

During high consumer periods, particularly during the summer, they then exceed the safe drinking water contaminate levels for arsenic.

They have in recent past been diligently looking for additional water supplies so that they can reduce the levels of the arsenic to where they were acceptable with safe drinking water regulations. The town of Three Forks, the city of Three Forks, pardon me, has a population of about 1,300 people. For them to embark on construction of a new water supply is a major task, particularly since they are aware that most all wells in the area have arsenic levels.

Quite recently they have obtained from the State department of commerce a grant in the amount of \$400,000 that will assist them in financing and constructing a new ground water supply. It's not enough to do the job. They have additional needs within the community as far as updating the existing water storage and distribution system, and they're facing some large consumers costs to make these needed repairs.

In addition to the community block grant which I mentioned from the department of commerce, they have more recently been able to obtain some participation through the department of mines, the State department of mines, to do ground water analysis within the immediate area.

There has been over the years some conjecture that the arsenic source is a natural source that is possibly from geothermal activity in Yellowstone Park carried through the Madison River system and then showing up in the Three Forks area. This has never been documented or substantiated to any great degree.

There's also the potential that the source of the arsenic may have been through agricultural use in past decades. It could have been from an accidental spill that may have occurred prior to the time that people have become so concerned about ground water pollution and pollution control. It could have been from a number of sources.

The city of Three Forks, of course, has very little resources to attack such a problem as monumental as this as far as determining what exactly that ground water pollution source is. They are, in a way, caught up between regulations to comply and their ability to fund those steps necessary to comply with the regulations, but I think they have been proceeding in a very responsible manner to the best of their ability and are on a schedule that hopefully will allow them to comply prior to the closing of 1984.

They have been issued by the State department of health and environmental sciences a mandate to comply by January 1, 1984, which at this point is impossible. They are proceeding, however, and hopefully will comply prior to the conclusion of 1984.

I think that Three Forks is a particular example where people want to comply. They want to be able to provide a safe source of drinking water for the citizens of Three Forks. However, with the massive amount of technology that must be utilized to determine the best means of compliance, it is simply beyond their means to come up with that.

I think that points up the need for some type of Federal funding and assistance, either Federal or through the State, to assist communities of this nature to comply with the Federal and State drinking water laws.

I think that more or less summarizes the situation at Three Forks.

Senator BAUCUS. Thank you, Doug. Now if you had to put your finger on it, what do you think the source of the arsenic problem is? You say there's a lot of possibilities, but in your gut, what do you think, and I'm not holding you to that because you need more information, but I'm just curious what the probabilities are as to what caused it.

Mr. DANIELS. I think at this point my own personal feeling is that it's probably a long-term situation that has evolved from the geothermal activity on the Madison River. However, I have spoken just causally with some hydrogeologists and they feel that the levels experienced there at the source of water at Three Forks are higher than what would be expected due to the dilution factor, so I have no conclusive means of knowing what that source might be.

Senator BAUCUS. But the point is it's there anyway, regardless.

Mr. DANIELS. It's there. Unfortunately, they can't point upstream and say: "There's an offender. We want Federal funds to square this away." There's no means of doing that. I'm not saying that that would be a pleasant thing for them to be able to do. However, it would be nice if they could gain some Federal funding.

Senator BAUCUS. But what I want to get clear is what are the options once you have identified the problem? Is one option to transfer water in?

Mr. DANIELS. Yes; it's not a very viable option. Yes; if you consider the options, that would be one option.

Another option would be the treatment of the water for removal of arsenic.

The third option, the one they're proceeding with, is hopefully to obtain an additional source of ground water that is pollution free.

The option you mentioned, I think very little analysis would tell you that's not a long-term solution that's very economical.

Senator BAUCUS. So that's out, so you've got the remaining two. Treatment is one; and the alternate ground water source is another. And between those two, which is the most viable?

Mr. DANIELS. Well, treatment, the capital outlay for the treatment facility itself, is very extensive, and then you get into a situation where you have ongoing operation and maintenance costs. It's a high-technology type of treatment, and it's difficult for a city the size of Three Forks to program the highly skilled people that would be necessary to operate that plant over a long-range period of time.

Senator BAUCUS. What would the capital and operating costs be, roughly?

Mr. DANIELS. In excess of one-half a million dollars and very likely up to \$1 million for a small plant that would simply reduce the

amount of the arsenic level to where it would be less than the Federal standard.

Senator BAUCUS. OK, and a third option is the alternate ground water source?

Mr. DANIELS. That's correct.

Senator BAUCUS. How viable is that?

Mr. DANIELS. We expect at this point, and we're still in the preliminary investigations as far as finding the source, but we expect that the construction of a well or infiltration gallery, the pumping station, and transmission line back to the city, will cost approximately \$600,000.

Senator BAUCUS. Where's the source then?

Mr. DANIELS. We expect now to go into the Jefferson River drainage to the west of town. We hope that this analysis that is ongoing right now with the Bureau of Mines will prove that this is the correct answer or possibly improve even on our preliminary recommendations.

Senator BAUCUS. What are the probabilities that you will get a good source there?

Mr. DANIELS. I believe we have an 80-percent chance or better.

Senator BAUCUS. Basically you are saying that, regardless of more Federal funds—I've never heard of anybody not wanting more Federal funds.

Mr. DANIELS. Right. This is always the bottom line of any of these needs. There's lots of things, you know, that should be done; and we can identify other people that would be doing them. But the bottom line is that no one really has the funds.

Senator BAUCUS. We've got a \$200 billion deficit, where do we cut?

Mr. DANIELS. I don't know. I think that's a little bit beyond the scope of what I provide for the city of Three Forks.

Senator BAUCUS. I absolutely agree with you, but this is unfortunately the problem we face every time. There's not enough money. And when I ask people where we should cut, it's always beyond the scope of their expertise, but it's frankly getting to be more and more by necessity within the scope of everyone's expertise.

I don't want to belabor the point, but we've got a \$1.3 trillion national debt; an annual \$200 billion deficit on top of that. That could be \$2.6 trillion by 1988-89. At 10-percent interest rates, it's going to be \$260 billion interest on that national debt. Some of that could go to Three Forks for ground water problems.

Mr. DANIELS. I think these communities are accepting the fact that they have a responsibility, not only for physically complying but to come up with the funding locally; and I think that the city of Three Forks has shown—Bozeman certainly has in some of their requirements for water and sewer in the past few years, the figures. And I think that the trend at the national level is that people are going to have to have the initiative locally to fund some of these needs themselves. I think I've seen that trend beginning to happen.

In a way I guess I'm a little reluctant to ask for more Federal funding because it always comes with strings.

Senator BAUCUS. I was going to say that.

Mr. DANIELS. And they can usually handle that better at the local level. There have been some things, very promising things, that have

come up in the State legislation this past year, that House bill 885 which provided for low-interest loans to communities. Unfortunately, by the time everything was done, the interest really isn't all that attractive. It could have been processed through at zero or 2 percent, and the cities still would have been, you know, responsible for repayment and so on, and it would have provided the incentive, you know, for those people to take care of some of those problems.

Unfortunately, it didn't go through the legislature.

Senator BAUCUS. I agree. Ground water is a local problem, and the more local communities, the city of Three Forks, the State of Montana, address and take care of it, the better off they are because when you ask for Federal funds, it's not only strings but it's clubs you've got to start worrying about. The more of this that is a Federal problem, the more there's going to be of Federal solutions and Federal approaches. The fact of the matter is, other people in other parts of the country, I think, are going to be thirsting for water, not only quantity of water but quality of water more than they have in the past.

The aqueducts, the water supply systems within the major cities are antiquated and were built a long time ago and they are starting to fall apart, and it's true in a lot of the major cities. So when the Congress starts looking at those problems and trying to figure out how to meet those problems, it's difficult.

Sure, we can work to get Federal dollars for us here at home, but the more we can keep the Feds in some respects out of it, we may be better off. It's not an easy answer. I mean there is a gray area here, but I just want you to be aware of that.

Mr. DANIELS. One of the things with Three Forks is the ground water situation extends substantially beyond the limits of their jurisdiction, and I think those areas are definitely, there is justification for some other funding, whether it be Federal, State, regional, whatever. It's simply beyond their control, and they're not only concerned that they do what is proper at this time to clean up their ground water, but they're concerned that 10 years down the road they don't find out that all of a sudden they have a different ground water problem that is coming in from somewhere else.

Senator BAUCUS. Thank you, Doug. I appreciate your taking the time to come here today and testify.

The next panel includes Mr. Gary Fritz who's the administrator of the water resources division of the Montana Department of Natural Resources and Conservation; Mr. Marvin Miller, chief of the hydrology division of the Montana Bureau of Mines and Geology; and Mr. Steve Pilcher, chief of the water quality bureau of the Montana Department of Health and Environmental Sciences. So gentlemen, why don't you come on up?

STATEMENT OF GARY FRITZ, ADMINISTRATOR, WATER RESOURCES DIVISION, MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

Mr. FRITH. First of all, I appreciate the efforts you have made to come to Montana to gather information about the ground water supply and ground water quality problems. I think it is important to listen

to some of us that have some knowledge of the ground water situation in Montana.

To give you a little background on the department of natural resources so you have a feeling from where we are coming in our concerns, we have two major responsibilities as it relates to ground water in Montana. Most importantly is our water rights responsibility. We are responsible for allocating ground water and surface waters, so we administer the water rights in the statutes of Montana.

Second, we are responsible for Montana's water development program, and we're finding a great deal of interest is being expressed in rural water supplies and especially some communities that are having serious problems with their ground water supply, so the State of Montana has set up a program to help finance water development projects, and a good number of those projects are turning out to be ground water supply projects.

So our responsibilities are not so much directly related to ground water quality regulations in Montana but more to ground water quantity; but, of course, the two are linked, and we are just peripherally involved in some of the ground water quality issues in the State.

One of the problems that we have seen exaggerated here over the last few years, and Senator Eck mentioned it, but I think it's worth repeating, is the saline seep problem. Originally that problem was identified primarily as an agricultural problem. In other words, of course, it was being caused by agricultural practices, but we thought originally that most of the adverse impacts were being suffered by the agricultural community as well, but it's turning out that the ground water problems created by saline seep are affecting many domestic wells and some municipality wells also.

The State has a saline seep program, and it's one of the programs that are funded through the water resources division of DNRC, so the State is addressing the problem both technically and financially, but I think that we are going to need to put more efforts into the solution of that problem if we are really going to see much of a solution on the ground to the problem.

The Superfund again has been mentioned, and in my testimony I mentioned the Superfund areas, but I think the important thing to recognize is that Montana is beginning or will begin to participate financially in the Superfund issues.

There was a bill passed in the last Montana legislative session that allocates a portion of the resource indemnity trust fund into the State and local share of the Superfund moneys.

You asked about whether or not we share ground water with neighboring States, and I guess I should mention that there's been a couple of issues currently about interstate ground water allocation.

The Madison Aquifer underlies both Montana, Wyoming, and the States of North and South Dakota; and in fact the controversy over the Madison Aquifer is what led ESTI to go to South Dakota for the water supply for the coal slurry project because they had originally applied to Wyoming to use ground water in that State; and South Dakota and other States objected to the use of that ground water because they thought it would dry up springs and wells in their State.

So that's the reason, they essentially abandoned those wells, that concept of using ground water in Wyoming, and went to South Dakota surface water, so there is an issue with ground water, interstate ground water allocation in Montana.

Another that is just coming to light recently is the Missouri River ancestral channel that we share with the State of North Dakota and Canada as well. The State of Montana is putting over \$300,000 into researching the ancestral channel ground water to see if we can better identify how much is there, where the recharge is——

Senator BAUCUS. Where is that?

Mr. FRITZ. In the extreme northeast of Montana.

Senator BAUCUS. That's that part of Montana that used to be Missouri years ago?

Mr. FRITZ. That's correct. Another issue that is of interest, and I would think to Three Forks and certainly the city of Bozeman, is downstream hydropower claims that are essentially precluding upstream development, including ground water development.

Senator Eck spoke of ground water opportunities, and we think there is a lot of opportunity in Montana to further develop the resource, but Montana Power Co., because of their hydropower rights, is saying that an acre-foot of water taken upstream is an acre-foot of water that does not go through our turbines, and because we have a water right for that amount, they essentially would like to close off the basin above Great Falls, for example. When they can show there is an interrelationship between ground water and surface water, which is true with most shallow ground water aquifers, then they try to preclude ground water appropriation also.

I know the city of Bozeman has applied for a larger water right for the domestic use, and Montana Power Co. has objected to that, so it's not a quality question, it's a quantity question, but I think it's a very serious one that's going to get even more political as Montana Power pushes their claims to that hydropower right.

We are finding, I think, a common thread throughout a lot of the ground water issues in the State. It's certainly coming out in the ground water advisory council, which Marvin and I are a member of and the one that Senator Eck referred to that the Governor appointed recently, and that is simply a lack of information about what our ground water is, how extensive it is, how it's recharged, where it's recharged, what it's uses are. I think it's something that we would like to see the Federal Government become more involved in.

Senator Eck mentioned the declining Federal dollars, and we think that's going to have a serious impact on those of us that regulate ground water and how good our decisions are if we really don't know what the resource is.

Last, I'd like to briefly mention the EPA national ground water strategy that's been developed and rejected two or three times, I guess, and now the EPA Administrator is trying to put together the national ground water strategy again, and we think it's a good idea.

In the past the drafts of this strategy have always deferred to the States for water rights, ground water rights administration. For one thing, they are very jealous, of course, but I think the ground water strategy that the EPA is putting together places national emphasis

on the ground water resource, and I think that we can only benefit by that.

I understand and appreciate your comments about the Federal club and the Federal string, but I think in this case as long as we can continue and convince the Federal Government that water rights administration belongs to the State, that the emphasis that ground water gets because of that strategy can only benefit Montana.

Thank you.

Senator BAUCUS. Marvin.

**STATEMENT OF MARVIN R. MILLER, CHIEF, HYDROLOGY DIVISION,
MONTANA BUREAU OF MINES AND GEOLOGY**

Mr. MILLER. I am with the Montana Bureau of Mines and Geology, and we are a research department of Montana College and Mineral Science and Technology part of the university system, and our organization has no regulatory powers at all, so our main function is to do ground water, or in my division, is to do ground water research projects throughout the State, as well as to provide State service to a large number of inquiries that come in throughout Montana.

There are all types of inquiries. Usually they come frequently from citizens, but also from numerous agencies, consulting groups, and so forth.

I was asked to comment on several things. Many of them were the same areas that Gary has just mentioned, and one was the dry land salinity or saline seep problems throughout the plains. Our organization has worked a number of years on the hydrogeological aspects, very closely with a whole host of other agencies and including the Agriculture Research Service, SCS, Extension Service, other State agencies, and I can, we definitely have a real problem. The seep has spread throughout the State, as Gary mentioned. It has contaminated a large number of shallow aquifers of the State, but in regard to that, we are making considerable progress on the solution to the problem of coming up with new flexible cropping systems that have controlled seeps.

There are several of the research sites that we started on 12 years ago that are 100 percent reclaimed now, back into full production, and the water quality has improved. The ground water beneath the sites has improved significantly. We have stopped the saline seep drainage into the coulee, so I think that we need to take research just one step further than just actually going out and investigating the problem, looking at it, but we need to follow through and come up with ways to solve problems, and certainly the saline seep one has been working here with the flexible cropping.

When Gary mentioned funding, his agency is funding a team to the triangle conservation district which has been quite effective in getting to the grassroots people and getting this started. We have a long ways to go. I would say maybe there's one-half of 1 percent of the farmers in the State have started converting over to the flexible cropping system, but it's an important start, and in many cases there are key farmers or leaders of the community in which others will, I

think, look at them and say, "Gosh, it's working," and so we're pretty pleased with that aspect.

As a result of the salinity problems, again Gary mentioned our rural water system problems, and one of the main reasons why we've had to go to extensive rural water systems throughout the plains region is the dry land saline seep problem. Our shallow ground water supplies are very poor, which has forced the communities and citizens to look for water supplies many, many miles away, tens of miles, 50 miles away from where they're at.

Also, it's been a real threat to the livestock industry in the plains region in that there is no potable water supply for the livestock industry, and so again rural water systems have been very important.

Senator BAUCUS. Could you described, what do you mean by "rural water systems?" Just anything bringing in water?

Mr. MILLER. It's usually a group of citizens will get together, anywhere from 10 to several hundred of them will get together and try to, we've looked at, our agency has looked at a number of those places to find fresh water sources, and then we will develop a well there, put in pipelines and distribute it over a large area.

Senator BAUCUS. Who pays for that?

Mr. MILLER. It's been paid for, I think primarily, out of Federal funds through various block grants. Citizens of some of the communities have paid out of their own pockets substantial sums of money to get it started.

Senator BAUCUS. Is that because of lack of quantity or is that because of poor quality?

Mr. MILLER. Mainly poor quality. We have considerable ground water throughout the State, particularly shallow ground water, but when it is rapidly deteriorated and poor quality, they just have to look for other areas.

Senator BAUCUS. Where is the best example of that?

Mr. MILLER. Several of them probably in north central Montana probably would be the best. Most of them, one example I have worked very closely with was the Highwood Bench in Chouteau County, south of Fort Benton. There was no fresh water supply, and there was 2,000 feet of shale below them, below the aquifers, and as a result, they all got together, located a well along Highway Creek, which was 10, 20 miles away from the closest user and up to about 35 miles away.

Senator BAUCUS. Again, is that a quality problem there?

Mr. MILLER. Yes. It was almost totally a quality problem.

Senator BAUCUS. That's surface or underground?

Mr. MILLER. Underground. They use ground water along Highway Creek. Ground water for the rural community seems to be the best way to go because they can't afford a treatment facility and so they need to find a potable source of ground water, and that's usually the direction they go.

Right out of there, there are several other examples. The community of Geraldine right now is trying to get a rural water supply going there. The community of Loma just north of Fort Benton went with a big rural water system, and I think that had some federal—I don't know exactly, Senator, where all the funds came from.

Senator BAUCUS. You pump it out or what?

Mr. MILLER. Yes, they do. It's usually wells with pump facilities. The State has money in Geraldine and Highwood through the water development program that I mentioned.

Senator BAUCUS. Thanks. Sorry. I didn't mean to interrupt your train of thought.

Mr. MILLER. Maybe other areas with acid mining problems, the State I was to mention, in the past there was considerable attention related to our coal hydrology and coal resources of the State, but most of our coal region is actually, if there's anything there, there's an alkaline problem rather than an acid mine water problem.

Senator BAUCUS. A what problem?

Mr. MILLER. Alkaline problem, too alkaline rather than too acid. However, we do have some acid mine drainage problems with our sulfide mineral deposits and a few coal deposits that are considerably older aged, one around Great Falls, Mont.; another one over around Red Lodge are two acid generating coal mines. By far our biggest acid mine water producers are our sulfide mineral deposits, and of course Butte mining operations has been one of the key ones for the last 100 years.

In fact, now that there's been a suspension of mining, of course it becomes a very important issue to consider long-term impacts, not only on what will happen on just present drainage out of there, but the possibility of reclamation, moving tailing piles; is that really the best thing to do to move tailings right adjacent to springs, or is it better to reclaim them?

These questions all need to be answered, and Superfund I'm sure will assist with that in that area.

There is going to be, I think, a real concern on movement of hazardous wastes along with this overall cleanup, particularly heavy metals and that sort of thing, that will have to be carefully monitored, I think, to look at the long-term impacts as far as the State.

There's surface ground relationships, one of the ones that Gary mentioned or both of them, the Madison limestone aquifer is certainly a tremendous aquifer to not only Montana but all our adjacent States, and there has been considerable work, investigations done with this aquifer through a cooperative program that we have had with the U.S. Geological Surveys, and they have done a tremendous study not only from our small co-op program, but also they pushed to have a large regional aquifer system analysis, their RASA study to look at the Madison Aquifer throughout not only Montana but North and South Dakota and Wyoming and of all the long-term impacts, and there has been considerable data put toward that, and I think it's certainly one example of where there has been good cooperation with the Federal moneys to a few State dollars, and I think we will see a lot of benefits out of a large regional study like that to look at interstate types of problems.

This very channel that Gary mentioned in the northeastern corner of the State is a very important potential source of ground water for Montana, and I think that's one area where the State should look into more of its opportunities of developing ground water to help free up some surface water in some areas and to better develop its own resources.

Along our major drainages, surface water-ground water interrelationships are very important. I think on a number of them we can actually develop more ground water along our major drainages to free up some surface water to maybe use in other areas or to be distributed downstream or whatever.

However, Gary mentioned the problem with the hydroelectric and power companies' demands on our water. That certainly has to be addressed or we are in a nondevelopment state.

I guess the other area which the Montana Bureau of Mines and Geology and relating to ground water is to really maintain and keep up a ground water data base. We are having an awful problem of keeping a data base operational, and it's really the only reason that it is up, and we do have considerable data into it, is thanks to some Federal agencies' support, particularly the U.S. Geological Survey and the Environmental Protection Agency. Each over the years have given us substantial grants to get a data base formed and to start providing service to the State, and we've been trying to keep it up and maintain it, and it certainly—the ground water task force has been actively considered to maintain and keep up the data base hopefully in the future.

I think that's it.

Senator BAUCUS. Thank you, Marvin, Steve.

**STATEMENT OF STEVE PILCHER, CHIEF, WATER QUALITY BUREAU,
MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL
SCIENCES**

Mr. PILCHER. My name is Steven L. Pilcher, chief of the water quality bureau of the Montana Department of Health and Environmental Sciences. You might expect that most of my comments will be quality-oriented rather than as Gary's were, dealing with the quantity issue, but I think we all do recognize the interaction between the two.

I also would like to begin by expressing our appreciation for you putting forth the effort to conduct this hearing in Montana, making available to local people the opportunity to testify and provide you with our thoughts and comments for whatever they are worth.

I know that speaking as a representative of the State agency, the chance that we would have participated in this level, should the hearings be limited to Washington, were pretty slim, so we do appreciate that, and as Senator Eck has already made reference to the budget process, we are all faced with that.

The water quality bureau deals with ground water in several different ways, and once in a while, I think, representatives of regulatory agencies and bureaucracy, so to speak, have a tendency to live from day to day and put out the little brush fires and not sit back and reflect on their total responsibilities, and I think this has given me an opportunity to look at the number of ways in which ground water, the number of roles that ground water does play in our programs.

As I said, we deal with it in a number of ways ranging from requiring communities such as Three Forks to provide a safe and potable water supply to the people to whom they are serving water, to the other end of the spectrum of requiring cleanup of spills and other ground

water, potential ground water polluting problems that we are involved in in a number of different ways.

The people in the State, as you are well aware, have always been concerned about protecting the quality of their resources, and I think this is evident by the strong surface water pollution control program that we have had for a number of years. This program involves the establishment of water quality standards, the issuance of waste discharge permits for those that might impact our water quality, and a strong enforcement program, but the development of a similar program for ground water has been very slow and really quite frustrating.

The Montana Water Quality Act provides a good legal basis for a ground water pollution control program. It prohibits pollution of State waters, which is a very all-encompassing statement, and it defines State waters to include ground waters; but due to the lack of the data base, due to the fact that you do not have access to ground water in the locations that you would always like and problems that were mentioned earlier, the development of that program has been very slow in coming.

In Montana, however, in 1982 the Board of Health and Environmental Sciences did adopt the Montana ground water pollution control program, and I have provided for the record a copy of that rule. It is somewhat unique. There are not a lot of States that have taken the initiative to develop the program. Rules may not provide all of the answers, but it is, I guess, best expressed as our intent or attempt to deal with one aspect of ground water pollution problems, and I think at the end of today the one thing that you will realize is that ground water pollution control is not a one-man show. It is so broad and all encompassing that it takes the efforts of a lot of different people to provide the protection that we are really looking for.

Senator BAUCUS. In a nutshell, what does that really provide?

Mr. PILCHER. It is a typical rule, rather difficult to digest on a first reading. The rule basically establishes four classes of ground water, ranging from class I, representing our highest quality waters that can be used for domestic purposes without or with little or no treatment. This is our highest quality ground water in the State, ranking from this class down to class IV ground waters which are suited for very limited industrial or commercial use but are not suitable for any of the higher class beneficial uses.

The regulation then established quality limits that must be met in order to protect for current and future beneficial uses. The regulation attempts to recognize and coordinate with other State and Federal entities having similar ground water protection responsibilities, and it goes so far as to point out that those activities or facilities that are currently being regulated in some fashion or other by another State or Federal agency, they are excluded from the permit requirements of the regulation, and I should have pointed out that the rule does require a permit for anyone conducting an activity or constructing a facility that might in some way adversely impact ground water quality.

Senator BAUCUS. If I were a farmer, what would I have to worry about?

Mr. PILCHER. If I were a farmer, I would look at the rule as more protection than a prohibition on my activities, in that agricultural

activities, for example, people have been accused of causing increased nitrate levels in ground water, and things like this.

The rule basically excludes from the permit requirements anyway the needs for a permit for that type of activity as long as it is being conducted in what is considered reasonable conservation practices. The types of activities to be regulated by this rule would include mining activities where, for example, cyanide might be used in the extraction of gold from ore material or from other types of industrial salvage-type processes, oil processing, not in conjunction with the activities regulated by the oil and gas conservation commission, and one thing I would point out is wherever agencies such as the Montana Oil and Gas Conservation Commission have responsibilities over oil and gas exploration, these facilities do not require a permit.

Another example of the coordination is solid waste management facilities. The sanitary landfills that are approved under current State regulations likewise would not have to obtain a permit.

It is intended, however, that the ground water standards portion of the rule would be used by anyone having a decisionmaking responsibility over activities that could impact ground water quality.

Another important aspect of the rule is the emergency powers designed to deal with spills or unanticipated discharges of any toxic material that would or could likely result in a violation of the water quality standards portion of that rule.

I think you will see that after the hearing today that threats to ground water quality are quite widespread and varied, and most significant problems we have faced, in addition to the problems of saline seep and some of the other problems that have been mentioned earlier, are spills from gasoline storage facilities, petroleum product spills that have reached ground water at some time in the past and are just now showing up in people's wells, waste from oil and gas development. The brine problem continues to be a problem in the northeast part of the State, impact from both hardrock mining, especially the gold operations, cyanide leach-type gold mining operations, and also gold activities are posing continued threats to ground water quality.

It's very apparent that no one program can deal adequately with all of those impacts, and instead control is going to have to come about by each program doing its job and providing protection for that area it is designed to protect.

The program that I have explained is preventative in nature and hopefully will prevent any damage to the ground water level of the Superfund sites that have been mentioned in several of the testimonies earlier.

We do not at this point, in my opinion, need additional regulatory controls. I think there is a point at which you become overregulated. Instead we need to concentrate our resources, whether they be financial or technical, on seeing that the job is done and properly administered, and applying programs that are already in effect. Anything that can be done at the Federal level that would assist in meeting those goals would be appreciated. I think at some point in time at the Federal level there might be a decision to balance out the requirements of programs such as the Safe Drinking Water Act and the requirement for high quality water to be served to the public; and

on the other hand, the financial assistance that might be available to clean up some of these problems. It's an all-encompassing and really an awesome problem to say the very least, and I'm sure that we do not need to bring that to your attention, but we hope we can continue to work together to protect this resource.

Senator BAUCUS. I appreciate that very much, Steve. Let me ask you a question I asked Senator Eck.

Putting aside regulatory questions, funding questions, interstate regulatory questions, where is the greatest problem? As you look across the State, just what—no pun intended—what percolates up as the biggest one or two or three problems as it grabs you right now?

Mr. PILCHER. I think saline seep, as has already been mentioned, is a continuing problem.

Senator BAUCUS. I'm asking all panelists now. Go ahead. Saline seep is one.

Mr. PILCHER. I think the problems associated with the oil and gas development and the problems with salinity increase in domestic wells, livestock watering, and springs, things like that has to rank as one of our biggest threats, and my third choice would be mining-related activities.

Senator BAUCUS. What about the other two? Do you agree with that thinking?

Mr. MILLER. I think that's pretty close. I believe we are getting quite a few inquiries concerning problems connected with subdivision development, urban sprawl, but usually that goes with more of the gasoline spills and things like that.

Mr. FRITZ. Well, from my perspective, I guess it would be first saline seep, and second, lack of knowledge of the resource, the lack of a data base, because we simply can't make good sound resource decisions without that information.

Senator BAUCUS. I understand that, but you don't have to get to that if it's not a problem.

Mr. FRITZ. I think the major philosophy that this Ground Water Advisory Council is using is that Montana is not at this point in time in the same situation as Arizona is, the same situation that New Mexico or Colorado is, and we want to be able, we want to make sure we have the tools in place and the information in hand so that we don't get to that point.

Senator BAUCUS. Now on that point, and you covered the subject pretty well here, all three of you, but can you identify some problems in some other States that are really severe? Just for the record here so that we are in a position to know about those, I'm talking about problems we don't yet experience, at least not in the same magnitude, but based upon what you know, what's going on in those States? How are they trying to solve them, and what are some of the problems in trying to solve them that we don't have to face yet, so we can benefit?

Mr. FRITZ. Probably the most conspicuous quantity problem is ground water depreciation in Arizona. They put together a large department of water resources about 5 years ago that they previously did not have to have. The large municipalities were simply depleting the aquifer much faster than it was being recharged, seriously undermining their ground water resource both for agriculture and municipi-

pal purposes, so they put together an entire State ground water code because people recognized it as a very serious problem.

They are limiting agricultural development in designated areas, and in fact they are taxing ground water users, and that money will be used to buy out and retire irrigated lands in Arizona. You couldn't even suggest such a thing in Montana.

Senator BAUCUS. That's primarily a depletion problem?

Mr. FRITZ. That one is a quantity problem.

Senator BAUCUS. Rather than quality?

Mr. FRITZ. That's right.

Senator BAUCUS. What quality problems are you aware of that are somewhat relevant to us here?

Mr. MILLER. In the quality end, in a way Montana is somewhat and North Dakota is somewhat unique in that changing of land use systems has generated quality problems of the saline seep type, whereas in much of the rest of the country we don't have near the salt load contained in the shallow profile to build up a water quality problem, and I think that's probably why water quality in this region, most of the States, say, "What problem?"

Senator BAUCUS. Because we have a higher salinity?

Mr. MILLER. Considerably more, three or four orders of magnitude higher in our glacial tills that cap saline marine shales in much of Montana.

The overdraft problem is a real one, and as Gary mentioned, even closer as in Nebraska in there on the high plains and the sand tills of Nebraska, it's getting closer.

Senator BAUCUS. What about the Madison aquifer?

Mr. MILLER. The Madison certainly could be an overdraft in some areas. The data indicates that the Madison limestone is very sporadic. In some areas it's absolutely fantastic, but in many other areas, probably a larger percentage of it, it's only a fair aquifer or a very poor one, and we could easily overdraft it. It's under tremendous pressure, so we are looking at widespread well interference problems that will extend over many hundreds of miles with overdevelopment, so it's important that we understand the resource before we get us into a situation of serious overdraft that could be one of the worst overdrafts in the future.

Senator BAUCUS. Going to you, Steve, as you work through this regulatory procedure, where do you see the biggest controversy, either present or potential, within the State? What groups really do you find pitted against each other and so forth?

Mr. PILCHER. I think at this point in time I don't feel that we have reached a position where we have that kind of controversy. I think the biggest limiting factor for all sides is the lack of a data base, especially in the case of ground water.

We are much more fortunate in surface water, ground water information is so limited that I think that hurts both sides.

Senator BAUCUS. What would the two sides be?

Mr. PILCHER. Well, on one side will always be those who will bring up in Montana anyway the provision—

Senator BAUCUS. Consumers and producers, those consumers and those that don't want to have restrictions on how they utilize their production?

Mr. PILCHER. I'm not sure that I can identify the participants in either side of the situation.

Senator BAUCUS. But has that been a problem?

Mr. PILCHER. Not at this point, it has not been a problem.

I think one important thing to bring up is the fact that Montana is fortunate as far as ground water quality is concerned, not having the industrial development that most other States have had. That is not to say that we do not have toxic waste problems as evidenced by the fact that five sites have been identified for Superfund activity, but I don't feel that we have the dioxin situation like in Missouri and places like that. It's not the same level. It's in differing degrees. We have some of that, but it can be, the difference can be explained by our lack of industrial development within the State, which from the the ground water quality standpoint is probably beneficial to us.

Senator BAUCUS. You mentioned the efforts in some kind of continuous cropping to get at saline seep in some areas where there's been a great reclamation. What I'm trying to get a feel for is how extensive the results are. You said only a small percentage of farmers are participating, what I'm trying to get at is how successful, from a results point of view, with the number of farmers participating, has the program been?

Mr. MILLER. There are several quite notable examples in the State where a large majority of them, in the Highwood Bench was one area, south of Fort Benton, where the research actually started. Well, 13 years ago, the original time when we poked the first holes, to today, and there was 100,000 acres was one example. There in that 100,000 acres today about 98 percent of it, of that 100,000-acre block, is in an intensive flexible farming system, and that has been the example of when there's really been a great reduction in the saline seep problem.

There were certainly several more attempts, both in the research effort, in the Extension Service, and getting them turned around using the grassroots approach. That experience then was funded through assistance with the department of natural resources, the triangle conservation district, which is a team of people specifically oriented to work with farmers, and right now they started over the last 4 years with a 10-county area, and I think they have over 300 actual farm plots or are working with 300 different farmers in getting them to switch over their cropping system program, and they have tried to pick key ones in the communities, the ones that asked for assistance as well, so they—I think we really see a ballooning effort. Once they see that it will work, that they can make money—that's probably one of the best things. They can make money with the system over the past summer following.

Senator BAUCUS. Maybe there's some incentive for some kind of a continuous cropping of some kind. The trouble is we may not have a farm program next year. It looks like it's not going to be. Everybody's going to be planting fence row to fence row, so I don't know, but it seems to me that a farm bill could help address the saline seep problems.

Mr. MILLER. This team has really assisted in trying to look at farm bills to see how they can get them to work, looking for any type of assistance programs within that, and have been rather vocal at vari-

ous times to try and encourage State committees and so forth to tune the farming systems to the seep problems, but obviously the farm program is a national one and it's a difficult one to deal with locally at times.

Senator BAUCUS. I'm trying to distinguish who's the shop here and who's the agency here?

In terms of regulatory activity, I guess Steve you are.

Mr. PILCHER. For the most part, they would fall within the department of health and environmental sciences, but as the regulations point out, the office of oil and gas conservation commission has specific responsibilities over oil and gas development and those activities that might impact ground water. We had the Federal UIC program, and at this point it's still being administered by the Environmental Protection Agency, so it's just to point out there's no one entity who has total responsibility even from a regulatory standpoint.

Senator BAUCUS. What about hazardous waste disposal? Do you see that as a problem in this State, and to what degree?

Mr. PILCHER. I don't think we have all the answers to that. As has been mentioned earlier, we have the five sites that have been identified for further Superfund activity, but in addition to that, the southwest management bureau of the department of health and environmental sciences is just getting into their kind of inventory and assessment of the 90 or 100 other potential sites. I don't know if any of those are of the same magnitude as Milltown, Anaconda and some of these.

Senator BAUCUS. How are hazardous wastes handled generally in the State? I mean, are they shipped out of the State?

Mr. PILCHER. Yes. They are shipped for the most part to the disposal site in Idaho. There is some discussion of the creation of an improved hazardous waste disposal site within the State. There was an attempt about 5 or 6 years ago by the solid waste management bureau to develop such a site. It met with such resistance that the plans were scuttled.

Senator BAUCUS. How much is shipped into Idaho?

Mr. PILCHER. I do not have that figure.

Senator BAUCUS. Just a rough figure.

Mr. PILCHER. I really don't know. I wouldn't even predict.

Senator BAUCUS. Not to North Dakota?

Mr. PILCHER. No.

Senator BAUCUS. Steve, I'm just curious why you're not seeking responsibility.

Mr. PILCHER. Under the UIC program?

Senator BAUCUS. Right.

Mr. PILCHER. That's a good question, a very obvious question. If you look at our past track record as an agency for assuming other delegated programs like the waste discharge permit program, the safe drinking water program, the construction grant program, I guess we've just reached the end of our rope.

We had some fears and concerns with the UIC program. It sounds like a good idea, but I'm not sure that it can be administered as it was envisioned, and I think this is reflected in the length of time that it has taken for anyone to do anything under the UIC program.

The UIC regulations have been on the books for several years, and yet just about 2 months ago the Environmental Protection Agency held a hearing on the first regulations for Montana. I think that is one thing that led to the State blundering ahead on their own knowing that we didn't have all the answers but feeling that we could not wait for Federal assistance in this particular area.

One of the biggest problems with the UIC program is the all or nothing type of approach. I think, I hope I have pointed out enough times that there are a number of actors in the ground water pollution control program. There is not one entity or agency that could assume total delegation of the UIC program. Bits and pieces could be delegated to those agencies having responsibility in a particular area, but no one at this point in time is in a position where they can assume the entire ball of wax, and I think that is creating some problems for the UIC program.

Senator BAUCUS. Any constructive suggestions you have that would help from our point of view, the Montana point of view, I would appreciate learning about. The Environment and Public Works Committee is an oversight committee, with jurisdiction over many programs. Any suggestions you have for this committee or others are helpful.

That's all the questions.

[Recess.]

Senator BAUCUS. OK, folks, let's go. The next panel includes Dr. Stephen Custer, who's a hydrogeologist for the department of earth sciences at great MSU. Dr. Jack Stanford was to be here. He is not here. The other panelist will be William Woessner, with the department of geology at the University of Montana, Missoula.

Why don't you both come on up. Go ahead, Steve.

STATEMENT OF DR. STEPHEN CUSTER, HYDROGEOLOGIST, DEPARTMENT OF EARTH SCIENCES, MONTANA STATE UNIVERSITY

Dr. CUSTER. I guess I should like to make it clear that I'm speaking as a hydrogeologist, not as a representative of Montana State University.

The point that I'd like to make may not totally be related to Montana, but perhaps to the Western region, and the point that I'd like to make really is that I think perhaps political considerations rather than sound science are controlling our hazardous waste disposal programs and that eventually we are going to pay dearly for that problem.

There are a couple of premises that I think we should begin with. The first premise is that we already have the waste. The waste is here. It's not a question of gosh, maybe if we don't dispose of it, they can't generate it. It's here.

The second premise that I'd like to suggest is that there are sites which are much safer than others from a hydrogeologic standpoint and that we should be going to those sites for our waste disposal, and perhaps this will be a politically unpopular statement, but I think that Montana has some of those sites available.

With those premises in place, I'd like to illustrate the hazards that politics are interjecting into the waste disposal problems we face, and

these have already come in, in earlier panel discussions indirectly, and I'm going to draw my example from nuclear waste, although I suppose I could do it from the Montana standpoint.

I recognize that nuclear waste is really not a toxic substance, but I will comment that associated with nuclear waste there are toxic substances that are moving, and in discussing with researchers in Idaho and Washington the nuclear waste problem, some of their more serious problems are actually toxic substances that are associated with the nuclear waste. Yet we often deal with them as nuclear problems.

My point here is that these hazardous, the nuclear waste is a real analog. What we see is an attitude that basically is, "Oh, keep it out of our State. We don't want it here."

Of course, no one wants to have these wastes next to their homes or near by. No one wants to have this hazard for their children, but we have the waste. Where are we going to put it? I think we should not be allowed to say, "No, I don't want it here." That's the wrong basis.

The right basis for a decision as to where siting should take place is the safety of the site. Right now the site locations are in the most expedient place, the place where someone, for one reason or another, where some State, where some local area, for one reason or another, has said, "Sure, we'll accept it."

Montana is in this right now, sort of. We're shifting all of our waste to Idaho. Where are we putting it? We are putting it in missile silos made by human beings, putting toxic wastes that may have lifetimes that are greater than the length of the lifetime of a nuclear silo, and if that silo breaks down, where will that waste go? Into the Snake River Aquifer. Interesting idea.

I don't think that we are siting our hazardous waste disposal facilities on the basis of the best site. We are siting them on the basis of expediency. As long as we continue to do that, we are going to have some serious problems.

The point then is that the decision as to suitability should be made on a scientific basis, and the people who make that decision should be broad-based. We should have chemists, zoologists, biologists, geologists, hydrologists, atmospheric scientists, people from a variety of disciplines looking at the best site.

I recognize that there is a great hazard of having scientists running our society, and I would caution that scientists are probably—not probably, certainly as human as anyone else and certainly make mistakes, and I'm not here to say that we should be running a technocratic society, but we must make the decisions on the basis of best site.

We should also be watching, I think, the problems of economics, and I'd like to address just for a minute the MSU chemical fire we had recently. I had a student who was interested in looking for potential sites for hazardous waste disposal in the State just to examine the potential in general. The response was, "Well, that's really a nice idea, but the cost of generating that site, finding it, establishing it, monitoring it, is so great that really we are not interested in supporting it because there's just no chance." Economics is dictating in part whether a site is developed and where. We should be careful to, I think, keep the cost of waste disposal for hazardous wastes low. One of the reasons people are apparently dumping materials where they are dumping

them is because they say, "I can't afford to put the materials in an appropriate place."

And so if we can keep the costs down, I think people will more likely place the wastes where they belong.

I think also, finally, that we should keep the transportation of wastes at a minimum. We shouldn't take them real far, and so we might consider the possibility of having a hazardous waste disposal site in every State, but I think we should be careful, because I don't think that every State has the hydrologic setting that would allow a site to be placed there. I suspect that Florida is one of those, as an example.

Montana, fortunately or unfortunately, is not one of the States that does not have a suitable site. To put it in a positive way, there are hydrogeologic sites that could be used, and I should comment this relates to the Federal Government because this, "No, I don't want the materials in the State," is also going on in the Federal level.

In the past when sites have been looked at, BLM for example has been very much against using Federal land for a site. If the reason for that is for a good sound scientific reason, so be it; but I think often it's from a managerial standpoint, a political standpoint that this decision is being made.

Senator BAUCUS. Thank you Steve. Mr. Woessner.

STATEMENT OF DR. WILLIAM WOESSNER, DEPARTMENT OF GEOLOGY, UNIVERSITY OF MONTANA

Dr. WOESSNER. Well, I'd like to thank the subcommittee for the opportunity to address issues on ground water protection and contamination. I will limit my remarks to what I feel are ground water quality problems and concerns of Montana, for the rural nature of Montana has not precluded it from significant ground water problems; problems faced by the State and its citizens, Federal land managers, and private industry.

Ground water is utilized as a drinking water supply by 58 percent of the population, and in many areas of the State is the sole domestic and livestock supply. The largest threat to the ground water quality of the State on a regional basis may be agricultural practices where strip fallow cropping has increased ground water recharge. In the geologic setting of northern and eastern Montana, the increase in water flowing below the root zone leaches salts from the soil and creates or expands areas of saline seepage. Within the 2,000 acres of land reduced in productivity, domestic and stock wells have also been effective.

Senator BAUCUS. You said 2,000. You mean 200,000?

Dr. WOESSNER. Excuse me, 200,000.

The effect of oil and gas development, specifically seismic shot holes and reserve pit reclamation techniques, have had and are having on the ground water resources of eastern Montana is of concern to State hydrogeologists.

Thousands of seismic shot holes have been drilled in eastern Montana, which typically penetrate more than one aquifer. Unrequired plugging of these holes for years has provided for aquifer intermixing and in some instances degradation of potable water quality. Reclama-

tion of the pit holding drilling fluids and produced brine associated with oil and gas well drilling has been proceeding for years without regard for the shallow ground water system. Pits which are lined to protect the ground water during drilling operations are usually reclaimed by tearing the liner with a backhoe and trenching the fluid away from the site.

Recent research has documented the contamination of a shallow ground water system adjacent to the Yellowstone River in Richland County. It is also easily seen that when a site-specific problem is translated to the over 1,100 well sites drilled in 1982 and the thousands of previously drilled wells, it creates a problem which is of regional concern.

The effects of hardrock and coal mining on the ground water resources of the State are generally more site specific than saline seep and oil and gas impact. However, two areas of concern include the large number of coal exploration holes drilled in southeastern Montana prior to mandatory plugging and the waste disposal practices of hardrock mines and smelters.

Coal exploration holes, just as seismic shot holes, provide for the intermixing of numerous aquifer systems in the coal region. Unfortunately, the impact of thousands of those holes is difficult to determine because little baseline data, predrilling information, is available.

Tailing ponds associated with large mining and smelting operations at Butte-Anaconda and the East Helena smelter and areas in which a large number of small mines are found, pose contamination of a region extending beyond the site specific. Trace metal contamination of the ground water at Butte-Anaconda has been identified, and at Milltown 60 miles downstream where mine tailings are trapped behind a dam. Reservoir sediments contain volumes of arsenic, lead, zinc, copper, manganese, and iron, which are each present in volumes measured in the hundreds of tons.

Though saline seep and mining related impacts cover large areas of the region, the State has also documented other sources of ground water contamination not atypical of most other States, such as 14 sites with petroleum product contamination; 1 site with 2-4-D; 1 site with pentachlorophenol; and 15 problem or suspected landfill sites. It should be noted, however, that the numbers referred to are only the reported cases.

The ground water problems mentioned in this statement cannot be resolved by the State alone, as the Federal Government is a major land manager in the State. The Bureau of Land Management manages 8.5 million acres, some of which are prime candidates for saline seep and oil and gas development.

The Forest Service manages land on which two-thirds of all of the State's surface water resources originate. That same land also provides ground water recharge to some of the State's ground water systems. However, Federal lands are not being managed always to minimize impacts to ground water resources. Further cooperation between the State and Federal governments is necessary.

In a time of budget cutting, ground water research and data collection has not escaped both State and Federal reductions. Basic research dollars are needed for contaminate transport efforts and waste disposal

facility siting and design. The Superfund is providing and will provide much needed dollars for ground water contamination identification, for remedial action and long-term management at least related to site-specific problems.

However, additional support is needed in Montana, one, to evaluate recharge mechanisms in western Montana and in the eastern coal regions; two, to identify the effect of mine spoils on ground water quality; three, to look at the effect of reserve pit reclamation techniques and shot holes on ground water resources in the oil and gas fields; and four, to build State hydrogeologic expertise and a hydrogeologic data base.

A major problem facing the State is the lack of well qualified hydrologists working in State technical management, planning, and enforcement areas.

Federal dollars expended on State cooperative programs dealing with ground water should encourage the State to build its capabilities in terms of properly trained staff, and more interaction with State and Federal surveys, the acquisition of up-to-date sampling, and monitoring equipment and development of an updated ground water data base. An improvement of the State's hydrogeologic capabilities will facilitate State, Federal, and private interaction.

I respectfully submit this testimony for the record, and again thank the committee for permitting me to testify.

Senator BAUCUS. Thanks, Bill. I'm going to ask you a question, Steve. You are basically saying to choose sites on the scientific basis.

Dr. CUSTER. Yes.

Senator BAUCUS. Only don't transport them great distances.

Dr. CUSTER. I think both of those things are important.

Senator BAUCUS. I think they both are too. Are there sites in Montana that are better than sites in Idaho?

Dr. CUSTER. I think research needs to be done. I think progress is being made, but in Montana, in Wyoming, I suspect in the Dakotas, there are areas that mine, in some cases, 30-foot thick bentonite beds. Why are they mining it? To line ponds so they don't leak. We have natural bodies of that type in the State.

Senator BAUCUS. Where are they?

Dr. CUSTER. Eastern Montana.

Senator BAUCUS. These are mines that are what, lined with bentonite?

Dr. CUSTER. No. They are the bentonite deposits that are being mined to place on bottoms of ponds.

Senator BAUCUS. Subterranean ponds.

Dr. CUSTER. OK. I want to make this clear. I want to separate two ideas.

Idea No. 1 is if people are trying to deal with the waste problem, and it's in a pond, typically they will like to line the bottom of the pond with bentonite. That helps to reduce the permeability. Where do they get the bentonite from? Wyoming, Montana, and the Dakotas. If the material is good enough to line ponds with, and if we have 30-foot thick deposits, it would strike me we probably do have sites that may be suitable.

The State is underlain in many areas by the Colorado shale, and certainly that shale has sandstone in it. Certainly that shale has drill

holes for oil wells that cause some trouble, but the shale is, in many places, 2,000 feet thick. It's not a well-known transmitter of fluids. Indeed it is tapping petroleum reserves. It seems to me we can isolate those materials if we use our heads.

Senator BAUCUS. What's wrong with shipping them out of State? If Idaho wants them, it's Idaho's decision.

Dr. CUSTER. Right, and then we'll all pay for it when they have a spill or a leak. I see a trend in the water well industry today. There are more and more conferences that are saying, "We're able to handle ground water pollution. If an excursion occurs, we can solve it."

What is the cost of going back and solving that problem? Ground water moves very slowly. It's very hard to get all of the water back out. That problem may be with us for literally centuries after something like that happens. The costs are equal to, in many cases greater, than the siting work to retrieve it, and we would pay for that.

Senator BAUCUS. I guess one question I have, in for the sake of argument, that if there are identifiable sites here in the State, what is the guarantee that wastes will not permeate? There's no guarantee.

Dr. CUSTER. Right. There's no guarantee of this anywhere. There's no ideal perfect society in the world, and I'm not advocating, "Oh, bring it all to Montana. We want it."

What I'm saying is that I don't think we should say we don't want it, therefore you can't site it here. I think that the potential for excursion always exists, but we want to minimize it, make it as small as possible.

Senator BAUCUS. What if the best sites in the west are in Montana, only from the scientific point of view, would you still advocate it all in the West, in Montana?

Dr. CUSTER. I'd rather see that than the salt plains.

This is Custer's opinion.

Senator BAUCUS. Is this your last stand?

Dr. CUSTER. I realize this is not a very popular stand, and I appreciate that, like I said about the nuclear business. I see us continually saying, "Well, let's put it where they'll take it."

Senator BAUCUS. I understand what you are saying. My worry is that nothing is guaranteed. I mean you go through Montana and there might be an earthquake.

Dr. CUSTER. Yes, the intermountain seismic belt. Much of the area that really is probably prime siting target is well to the east of that.

Senator BAUCUS. That concerns me, frankly.

I'm curious to ask some of the same questions of you that I asked the other panelists; that is, I take it from your testimony, Bill, you think some of the greater problems are oil, gas, and seismic drilling around the State. Is that right?

Dr. WOESSNER. I don't know how great of a problem they are, more than, say, they are regionally oriented where they look at first glance as being very site-specific, but it's just a little oil well that's not any problem. But when you put thousands of them together, all of a sudden eastern Montana starts to be checkerboarded with large areas that are little site-specific problems. So I think as far as looking at the overall State resources, that you get worried when you look at large areas of the State, agricultural, for saline seep problems agricultural land is being taken out of production and for oil and gas development po-

tentially contaminating ground water, which is basically a stock and domestic supply in very rural parts of the State which is dependent upon the land for the livelihood of the people. They need that resource. Without that, they can't ranch in that neck of the woods.

Senator BAUCUS. So far as you know, is the rural development program a good way to go here? Do you think it helps rural Montana meet some of its problems?

What about all the seismic drilling; it's there, and we need oil and gas. Would you suggest that oil and gas developers be required to ask for permits before they hire seismic crews to go out and get their data? What do we do about it?

Dr. WOESSNER. We are already taking steps to try to require, for example, the plugging of these holes as they're drilled, during the drilling, before the explosions go off, reentering the holes to plug them in a way in which we won't have intermixing of the aquifer systems. Unfortunately, this is a very new thing, and we're still working on developing it statewide, but there's already probably a lot of damage that's taken place already, and what to do about it? There are some ranching, some conservation districts that are working on the problem. Marvin Miller with the Bureau of Mines and Geology can probably address it in a much more complete manner, because they have been working on some of the ranchers going back in and entering the holes and replugging them because of their concern, and I think he would be the person to talk with specifically.

Senator BAUCUS. But based upon your information, are you running into any resistance with the oil and gas industry about plugging?

Dr. WOESSNER. Again, it's something that I mentioned from discussions with Marvin Miller again, who I think would be the best person to ask.

Senator BAUCUS. Are septic tanks a problem in the State anywhere?

Dr. WOESSNER. I didn't put that on my list. It's another one of the not atypical problems in Montana. We're especially concerned about them in some of the western valleys of Montana where we have not the problems where they won't work because they won't infiltrate the water fast enough. Instead they take the water so easily, we're concerned with them potentially contaminating the shallow ground water supplies because the soils are not doing what they're supposed to be doing, like treating the effluent.

In Missoula Valley we started a study to look at some of the sites specifically to see whether or not we are having difficulties with the septic systems.

Dr. CUSTER. The same is true in the Gallatin Valley in terms of the density. The 208 commission study suggested there was some potential for nitrate pollution, and I think it's something that we're going to have to monitor. I don't think we've seen serious problems yet, but we have to watch over it because as the subdivisions get more and more dense and more and more people gather together into those systems, the potential increases.

I was wondering if I could point out the existence of a couple of things along the lines Bill was talking about?

Senator BAUCUS. Sure.

Dr. CUSTER. No one has mentioned today, and I think it's important because you've been asking a question that's related to this. This is a report called the Groundwater Status Report produced by the department of natural resources and conservation in the last year in which ground water researchers and departments across the State tried to draw together many of these problems.

Senator BAUCUS. Tried to do what?

Dr. CUSTER. Identify the problems, and tried to work on what would be done. That document is available and might be of use to you in helping to bring them together into a whole.

Senator BAUCUS. The question I was going to ask earlier with respect to septic tanks or whether solvents and degreasers are used to clean out septic tanks, is that process used at all in the Gallatin Valley or anywhere else in the State?

Dr. CUSTER. I don't know.

Dr. WOESSNER. Not that I'm familiar with.

Senator BAUCUS. What is the biggest ground water problem in the State?

Let me back off and take another more distant view here. You have heard some of the panelists no doubt. Based upon your own experience and what you have heard, I'll give you a chance now to say whatever is on your mind or might be a little bit under your skin to take advantage of your wisdom here.

Dr. CUSTER. I think clearly saline seep is a big problem.

Senator BAUCUS. What's the problem there? Just getting farmers to change their practices or what?

Dr. CUSTER. Yes. As Marvin said earlier, there's no question if we can get people to change their farming practices, we're going to significantly improve the situation.

I would comment in respect to this farm bill, of course this gets into a can of worms that I'm not very good at in politics certainly, but it seems to me that the depth of any saline seep program that we have is going to be telling people to take crops out of production. We've got to get people out there in a flexible cropping manner. It's the only way we're going to keep that ground water system from behaving the way we know it behaves, and I would comment too that there's a tendency, I think, to look at big systems and say that those are really important. I think in Montana the small water supply is a very important factor for the Montanans. They will literally not be able to survive without those single domestic wells, and they don't look like big systems, but we have people that aren't going to be able to make it without them.

Dr. WOESSNER. I'd reiterate that as far as a regional problem, a regional situation, the number of wells and the stock, and domestic wells actually put out of production is, I don't have a figure right up front, and you probably already talked with Marvin about that, but there are some other concerns.

I think maybe one of my first concerns is that I'm fairly new to the State of Montana as far as my position at the university. I'm not sure if we have identified all the problems yet. I don't think we have the data base, that we have evaluated the data base and refined it and built it up enough that we can identify what all the problems are.

Senator BAUCUS. Where were you before?

Dr. WOESSNER. Desert Research Institute, Nevada.

They like nuclear waste down there.

Senator BAUCUS. How do you go about developing a data base?

Dr. WOESSNER. Well, I think that that's one of our major problems in the State of Montana is that we don't even know what we have in part. I mean, we are trying to make an effort to sort things out, but we've never had the support except through some EPA funding originally to try to work on some things in southwestern Montana to basically review. I just got here, so I haven't heard what went on before, so I'm not trying to say something that's already been said. If I am, please stop me, but I think that our first problem is that we don't know what we have, and we don't have it organized in a way that is sufficient to really examine where the problem areas are and where they are not or how severe they are or how severe they are not.

Senator BAUCUS. That's a good point and reminds me of a problem that we faced quite severely several years ago and still face to some degree, and that is having the data base to counteract and enable us to present our best arguments in dealing with British Columbia and Canada with respect to Cabin Creek development. I wish Jack Stanford were here. He was very heavily involved in helping put that together, but we had, as you know, a regionwide environmental impact statement, the main purpose of which was to gather the data; the water, particularly, and, in some degree, the air, and how it affects the Flathead region.

We are now in a much better position because we have better data than before to monitor what's happened to the North Fork and Flathead and monitor the changes in the water quality in the area as well as the air quality in the area, so that we, the decisionmakers, that is the city of Kalispell, the county, Flathead, the State of Montana, Forest Service, BLM, Congress, the EPA, and so forth can be in a better position to hopefully make wiser decisions with respect to potential development or potential changes up there.

It might make sense if various people in the State try to devise a kind of Montana-wide ground water data base proposal. Maybe that's something that we can work on putting together in conjunction with the EPA. We can propose a kind of regionwide data base system that is somewhat analogous to the Flathead experience. That's a possibility here, and I encourage you in your domains to try and see if that's possible. I agree. I think that we just don't have all the data we really need. We never have all the data you need, but still I don't think we are even close to that point of deciding whether or not we have enough.

Dr. WOESSNER. Then it's obvious also that when that's completed, there will be areas where there's big holes, where we don't have anything and where we'll need to expend major efforts, major dollars, to gather that new data. Unfortunately, ground water becomes very expensive.

Senator BAUCUS. What are we going to put in those holes?

Dr. WOESSNER. Not waste.

Dr. CUSTER. We should be careful about having the short-term data base. I think there's a tendency to say: "Goody, we'll get a data base," so we put in a data base and monitor it for 1 or 2 years, and poof, the

dollars dry up and there's no more monitoring. The longevity of hydrologic data is very important, and we should keep that in mind, not just make it short term.

Dr. WOESSNER. If I could make one last response to your question on the major problems of Montana, being from the western part of the State I should bring up that as we get more and more into the heavy industry and mining industry in western Montana, we certainly have to have some concern over the, how far reaching the effects of the operations of Butte-Anaconda actually were, mainly in respect to the Clark Fork River drainage, which is a major drainage in the State, and we certainly already have identified some problems at the Anaconda smelter area, tailing-pond problems, and we've identified some problems further downstream, and it's one of those things that as we start looking, then we start finding, and there have been a lot of hardrock-mining operations in the State, and for years the standard operating procedure was to handle wastes in a particular manner, and that's the way things were, but now the question becomes that are we going to have impacts on the ground water and surface water resources of the region? And I think that's where there's certainly some concern on my part, on the effects of mining on the larger picture of the State.

Senator BAUCUS. I agree with that, but I think it would be helpful to figure out a way to systematically try to get the data. It can't just be short term, you have to look down the road a little bit. The same thing with the tailings as they affect the Milltown water supply, that's something that's built up over a long period of time, and that's basically arsenic; isn't it?

Dr. WOESSNER. That's one of the many. It is the major problem, which is the reason for the site.

Senator BAUCUS. Do you have any questions, any views with respect to allocation of State, Federal regulations, pollutants or hazardous wastes permits and so forth?

We are a thinly populated State, we are not like some of the more populated States. As you pointed out, Steve, there's lot of little water systems that you have that are very important to the smaller communities. I'm just curious whether, because of a transboundary movement in water, and because of interstate transportation of hazardous wastes, what role should the Federal Government play here? It's a temptation for us to say: "Feds, stay away. We can take care of all those problems ourselves."

Can we?

Dr. WOESSNER. I don't think so. I think the role of the Federal Government should be to do very much what it does when it says: "Here are the minimal standards for safe water for safe drinking water quality. Here are the minimal standards for waste disposal sites, and if the State of Montana wants to dispose of things, here is how you do it."

If you want to be tougher on the operators or on the water-supply system, that's up to you. That's your prerogative, but I think they have a very important role because they have tremendous resources to look at the large problems, the generalized problems of ground water contamination and regulation and control, and that they should continue to do that because the State of Montana is never going to

have the dollars to do that kind of work, but they certainly can benefit from it as far as saying: "Here are the minimal requirements that are, if you have so many houses, you should be monitoring so and so forth." To me that's a very important role of the Federal Government.

Senator BAUCUS. What are the major surface impoundment locations in Montana which adversely affect either drinking water supplies or other kinds of water supplies?

I suppose it would be where the major tailing ponds are.

Dr. WOESSNER. As far as potential for a situation like the Milltown one cropping up, there's Thompson Falls further down on the river, but I don't have the data off the top of my head when it was constructed, but we feel one of the challenges at Milltown is it's been around since 1907, so it's been there for a long time and was active in trapping those wastes for a long time; and Thompson Falls, it's a matter of how long it was there, and I'm sure that it has deposited hazardous wastes in the reservoir, but the quantity of them we have no idea on how much is there.

And then in East Helena, the smelter in East Helena and the Prickly Pear Creek mining in the Prickly Pear Creek drainage coming down through Helena, and the East Helena smelter and the wastes that were deposited into those streams and their final fate, and is it Lake Helena? That lake right down there.

Senator BAUCUS. Do we have enough information to know the degree to which those impoundments are going to cause problems? Are those impoundments small enough so that it's not a big deal? Or do we just not have the data?

Dr. WOESSNER. I think that we don't have the data on Thompson Falls, for example. I think we'll have it, the data on Milltown fairly shortly. We are in pretty good shape with the Superfunds that's been generated into that, but without them we would still be, there would still be lots of unknowns as far as what would be going on.

In East Helena, Dr. John Moore of the University of Montana has done some sediment sampling and found fairly significant levels of things like lead and zinc, and the sediments were way above what would be typical of what somebody in Wisconsin would consider polluted or somebody in Tacoma, Wash., would consider polluted in their reservoir. I mean, it's there, and it's a matter of how well it interacts with the ground water system.

Dr. CUSTER. Cooke City would be another example. I don't know if we've got a good inventory, but the trouble is, what do you do with the material?

Senator BAUCUS. That question bugs you, doesn't it?

Dr. CUSTER. Yes; it does. This is really a serious problem. We have this giant impoundment of material that's been collected over many years. It's not a small body of stuff. Where does it go?

Senator BAUCUS. So you are suggesting because that material has accumulated, it's kind of a time bomb, and we've got to ask ourselves how do we handle it? What do we do with it? And you are further suggesting that perhaps there should be more of an effort, particularly scientific effort, to identify safe sites, the safest sites around.

Dr. CUSTER. I want to make one statement, and that is I'm not saying that we should necessarily dig those out and move them some-

place. I'm not saying that's the best solution. I'm simply asking the question that we are dealing with a large body of material and there may be other approaches to the problem.

Senator BAUCUS. But within the State of Montana, where is the largest body of material?

Dr. CUSTER. I don't know. I wouldn't want to comment on the relative sizes of these things.

Dr. WOESSNER. Anaconda, Butte, Great Falls, Helena. It's probably in that area. There's where we have had a lot of waste generated.

Senator BAUCUS. What happens when a pit fills up?

Dr. WOESSNER. I think we are in serious trouble. And that's another whole area that we haven't addressed, and that's a very serious problem because not only is the water table going to rise, the pits receive a tremendous amount of surface flood right now from the impoundments up above, and its cheesecake in there. There's old adits. There's fractures and everything else. The pit could give way and as it fills up higher and higher, and you've got all the hydrostatic pressure building up in the pit, and there are some real serious implications; pH in the water is 2 or 3.

Senator BAUCUS. What does that mean, 2 or 3?

Dr. WOESSNER. Seven is normal. It means it's very acidic, which means, of course, it's coming out of old mine adits and shafts and everything else which were highly mineralized, and I'm sure the mineralogy of the water would be horrifying.

Dr. CUSTER. The total dissolved solids contents I saw 2 days ago at the department of State land values is in the range of 15,000 parts per million, total of all solids; very, very saline water.

Dr. WOESSNER. Drinking water is 500.

Dr. CUSTER. And this is containing heavy metals. It's really not nice water at all.

Dr. WOESSNER. It's not only a threat to the people in Butte. I feel it is also a threat to the people who live on the Clark Fork drainage. Silverbow Creek is another Superfund site which is going to start receiving potentially more contaminated ground water base flow as the water table rises in the valley. It certainly concerns us, but that's a whole other issue. I think it's a very important one. I think it's one that the Superfund should look at quickly to see whether or not there is a potential to have it as a Superfund center.

Senator BAUCUS. Who's doing most of the work on that question?

Dr. WOESSNER. Marv Miller. If he was here, he could answer that the best because he's the, Butte is doing some of that, and I think also that Anaconda was doing some and the other, the EPA people could answer that better.

Dr. CUSTER. A lot of it is coming out of the company itself.

Dr. WOESSNER. If I could make one more comment on the waste disposal issue that Steve brought up, and that's when we say we don't want it in Montana, but one of the challenges that we face is landfill sites all over the State are receiving small quantities of toxic and hazardous waste from the agricultural industry and from other, oil disposal, just things to get rid of, and you are looking at the landfill property owners who don't know what's going on a lot of the time, so a lot of our landfills in the State are probably already receiving toxic and hazardous waste, and there again we can have

fairly statewide problems. We have no idea on what's really in those, and in one of our ground water advisory council meetings, it was brought up that there was a program to collect pesticides and hazardous wastes and people said, "We don't know about it or how, where does it go? We don't have any way to take it to a central place to get rid of our old pesticide containers," and everything. So if there was a site in the State, it certainly probably could be used for toxic and hazardous waste in the rural areas which are now finding their regulatory landfills.

Senator BAUCUS. Thank you very much. You have been very provocative. The hearing will now be in recess until 1:30.

[Luncheon recess.]

Senator BAUCUS. The hearing will come to order. Our next witnesses are Tom Daubert of the environmental information center; and Dennis Unsworth, who is with the Northern Plains Resource Council. Tom?

STATEMENT OF TOM DAUBERT, ENVIRONMENTAL INFORMATION CENTER

Mr. DAUBERT. I will join everyone else in thanking you and your committee for taking the initiative to come out here. Clearly we, as well as everyone else, would not have been able to make a contribution to your work if you hadn't come to Montana for his hearing.

I'd like to just focus briefly on several aspects of ground water problems that we at the environmental information center have only just begun to focus on in the last year or so. First, as everyone else pretty much alluded to, I think, is the need for more research. One of the biggest problems we face with ground water issues as well as many resource issues is just the lack of a deep enough understanding; first, of what we've got in the way of ground water resources; and second, how our ground water behaves.

And as a result of the fact that we don't have a full enough understanding of these things, we continue to make policy decisions on the basis of incomplete understanding of the world and that, I believe, are continuing to create new kinds of problems.

One of the things Congress has been looking at is how to clean up existing problems, but we need to pay more attention to how to create new policies that will prevent new problems.

Just an example of how this continues to occur, I'd like to mention briefly some things about the ground water degradation permitting system that Steve Pilcher talked about this morning that he didn't get very deeply into. That permitting policy is built around the concept of a mixing zone for ground water. What we do in that permitting system is grant industries the right to pollute ground water within what we call a mixing zone, and then we assume that beyond the boundaries of that mixing zone, there will be no ground water degradation. Now that assumes that ground water does mix, that it does dilute, and when it spreads and that as it spreads it becomes clean. Now I'm not a technical expert on this issue, but the people I talk to that are telling me that ground water does not behave that way. It certainly does not behave that way everywhere, and so what we are

looking at even with this very new policy is a very new rule in Montana of nondegradation of ground water. It is a policy that allows site-specific degradation, and this assumes that that degradation wouldn't get out of hand. And there are a lot, or some technical problems in making those kinds of assumptions.

I think we need to know a whole lot more of how ground water behaves as pertains, as regards dilution and absorption and then containment of pollution once it develops.

A related problem to me, or I guess this is really a fundamental point I'm making, is that we should refuse to enact new policies that can't be supported by an educated understanding of our world, and that we certainly should refuse to delude ourselves by enacting policies that sometimes go so far as to fly in the face of what we know about the world.

And I would say that perhaps more than any other environmental issue that the two themes of toxics and ground water illustrate what I consider the essential correctness of the message that the environmental movement has brought us, and that message is that we can't afford on any basis, economically or otherwise, to pretend that what we know is not true. That old adage, "Out of sight, out of mind," has no place, no responsible place in natural resource policy making, particularly where toxics and ground water are concerned. And I think that like the many ground water contamination problems and toxics problems nationwide have illustrated the folly of delaying, of postponing the facing up to the realities that surround us. We only increase the social costs involved in living in a world that involves toxics by not facing up to what toxics requires of us up to the realities that surround us. We only increase the social costs involved in living in a world that involves toxics by not facing up to what toxics requires of us up front rather than after the fact.

I think another, a widespread problem relating to this that we have created and that Congress in my view is beginning, is responding to very well right now concerns the Resource Conservation and Recovery Act. I guess the Environmental Information Center would like to publicly thank you and all the members of this commission for recently recommending that in the RCRA's reauthorization, that the definition of a large quantity generator of hazardous wastes be lowered from a thousand kilograms to 100 kilograms per month. We see that as very important to everyone. But of course one of the things that that improvement involves is a recognition that what we have been doing with hazardous waste disposal has not made sense, and that we have created problems nationwide through allowing small quantities, so called small quantities of hazardous wastes to be disposed of in our landfills.

The problem we face in Montana, and I can only assume that this is true pretty much everywhere, is that our county landfills were not sited with any thought as to what might happen to ground water down the road, especially not with respect to toxic substances. And so these landfills are sited often times in poor places. They're often, they're rarely, if ever, designed to deal with toxic contamination. They're usually not monitored adequately for the development of potential problems.

Now we are discovering in some sites in Montana, some of our landfills, that organic contamination has begun to occur of ground water in the surrounding areas; so it's only a matter of time, we can assume, before the toxic stuff that we have permitted on a small quantity basis to start creating problems, and of course in the aggregate we are not dealing with small quantities of toxics at these landfills at all. It can become significant quantities.

I brought with me a front page article from yesterday's Independent Record that relates directly to this issue. I'll just give it to you now.

Senator BAUCUS. Thank you.

Mr. DAUBERT. I see a great need for Federal funding and State funding for improved monitoring at local landfill sites in Montana. One of the things I would assume you've heard is that in response to the expected change in that RCRA definition, Montana has begun a feasibility study for siting hazardous waste up here in the State. People have talked to you this morning about how we are shipping all our hazardous wastes to Idaho or Washington, and I think the expectation here in Montana on the part of our State agencies is once that RCRA change passes Congress, assuming it does, Idaho may well stop accepting our hazardous wastes just because of the increase of the amount of hazardous wastes that, from Idaho alone, that needs to be absorbed at that site.

So Montana has begun to try to get ahead, to start to be able to respond to a potential problem there. Our State agencies are hoping to be able to create a hazardous waste dump here, and I guess I would want to point out that I don't see even one hazardous-waste site in Montana as solving the real problems. Right now the distance from anywhere in Montana to the site in Idaho is significant enough that the cost of shipping your waste there is high enough that functionally there is a disincentive to following the law.

I think there are a fair number of people and agencies and institutions that probably dispose of their wastes either illegally, well illegally, rather than pay the exorbitant cost of shipping wastes to Idaho. One incident that occurred here in Montana just this past spring, the city of Dillon had two barrels of chemicals that they wanted to dispose of. They called the hazardous waste bureau in the State health department and asked for advice on how to dispose of it properly and were simply told that it's better to find a beneficial use than to pay the exorbitant cost of shipping it to Idaho. And so what they did was they applied those chemicals to an irrigation ditch for weed control without knowing what the chemicals were, and we ended up having arsenic contamination at that site.

I would suggest that almost no matter where we might place hazardous waste dumps in Montana, functionally people are going to face the same economic disincentives just because of the geographic size of Montana and the distances people have to deal with. That's going to be true, I suppose, throughout a large part of the West.

So while we commend Congress and this committee for recommending that change in RCRA, we don't believe that lowering that definition is by itself going to solve the full realm of the problem we've already created.

Another very serious problem relating to that is just enforcement, the inadequate funding we face here in Montana for our State agencies, and only part of that is due to the cutbacks in Federal support for environmental monitoring and enforcement.

I think another potential ground water problem issue that we've been working on at the Environmental Information Center concerns pesticides, and I'd like to just briefly talk about some of those problems, and I should preface this by saying that on my own time I am a member of the Lewis and Clark County Weed Board, so some of what I'm about to say comes from that experience. But shortly before the county commission in Lewis and Clark appointed me to that board, members of our weed crew were observed spraying tordon into Ten Mile Creek, and Ten Mile Creek is where Helena gets its water supply. Fortunately that occurred downstream from the intake for our water, but it was still a very serious violation of the tordon label.

I think there are several problems I want to call your attention to.

Senator BAUCUS. What's tordon?

Mr. DAUBERT. Tordon is probably one of the most commonly used herbicides, and its active ingredient is picloram. Picloram was registered by the EPA on the basis of data provided by IBT, Industrial Bio-Test Laboratories. Their leadership was very recently convicted of fraud and conspiracy in Chicago Federal Court, and there are some 44 commonly used chemicals in the Nation that were approved primarily on the basis of data now know to be invalid or fraudulent provided by them. Tordon was among those.

Federal law does not provide for the deauthorization of chemicals when it's discovered that the data its registration was based on was inaccurate.

That is to me a very serious problem because in effect with tordon, as well as those other chemicals, we are looking at a situation where the intent of FIFRA in terms of demonstrating that benefits exceed the risks has been completely subverted. So meanwhile we are using those chemicals widely, tordon especially.

Well, in the course of the investigation our weed board launched into that incident, we discovered as a surprise really to us that the tordon label requires that it be only, that it not be used wherever ground water is shallower than 10 feet. Now to me that means several things. That means if you don't know anything about your ground water resources in your location, then you have no business using tordon at all, and if you are a weed board, an institution of government like that, I would think at a minimum you ought to be required to have a map of your ground water resources as some indication that you have a decent methodology in deciding where to use the stuff. But to my knowledge, no such methodology is followed by any weed board in Montana.

So I would step out on a limb without any proof and assert that most of the tordon used in the State is illegal in that sense, and again you come back to the enforcement problems. It is very difficult, if not impossible for the State agencies which EPA has allowed the right to administer the law, it's almost impossible for them to effectively enforce the law, and I guess would have to assert that I think that's a serious problem in general, that the EPA authorizes State agencies

or when the Federal Government grants the State agencies the right to administer particular programs, it behooves the EPA and the Federal Government to do what I would, to do a more effective job of monitoring the performance of those State agencies.

There have been some GAO studies that have shown that States throughout the West do a very poor job of administering pesticide laws and of enforcing them, and I think it's critical that Congress react positively to these kinds of findings and that, well, the Environmental Information Center strongly supports the FIFRA form bill that's being introduced, that hopefully there might be some action on next year, because it would close a lot of the more glaring loopholes in that law.

We always come back to the question of costs in just monitoring in such enforcement, and I guess we would just assert that part of the social cost of living in a world that includes toxic substances is the need to have thorough monitoring and enforcement programs for these kinds of programs, and again our general message is that it's far cheaper and less hazardous to deal, to face up to these responsibilities and begin paying for them up front rather than allowing far more serious problems to develop that are far more costly to deal with. We can only delude ourselves so long.

That's basically what I came here to talk to you about today.

Senator BAUCUS. Thanks, Tom.

Dennis?

STATEMENT OF DENNIS UNSWORTH, NORTHERN PLAINS RESOURCE COUNCIL

Mr. UNSWORTH. I'm Dennis Unsworth, and I'm with the staff of the Northern Plains Resource Council, and as such I don't have the latitude or the liberty to make extensive comments. I sit here so Tom is not by himself sitting here.

I would like to thank you for the opportunity and the invitation that we were given was, well, it was very nice. It was a very earnest attempt to get someone here to represent Northern Plains Resource Council, and we appreciate that opportunity. We will be submitting written comments, and I would like to give you just a summary of those comments, and I hope that you'll then seek out those comments and look into those specific things that we would like to present.

Senator BAUCUS. Well sure. The hearing record will be open anyway. If Northern Plains wants to submit a statement for the record, they certainly are welcome to do so.

Mr. UNSWORTH. We'll do that. Northern Plains has had considerable experience in specific cases of ground water problems or potential ground water problems, and those are the things that we would like to comment on.

My personal experience is that ground water is very little understood. Experience comes out of the Poplar River instance particularly first; a great deal of debate and study on the ground water issue there. What is in our ground water and what can we expect when we put something in the ground where there's ground water present and

what will happen? The question is raised what's the difference between a ground water hydrologist and a surface water hydrologist; two different people who study water but study it different places.

A surface water hydrologist is a scientist. A ground water hydrologist is a magician in many cases. They use mirrors; they use mathematical models. It's poorly understood. Probing ground water in many ways is like probing space; maybe a little more difficult. You can't really see down there. You can get a glimpse of it through a small hole usually 4 inches or 6 inches, but you can't see down there so you make a lot of guesses. So I see through materials that have been sent out, the congressional research materials, et cetera, that there's a great deal of interest in ground water, and that there's some focus, but I think we are really getting into a big issue and at least on the Poplar River case, we can see very clearly that we don't understand it. We really don't know what's down there.

So I, in our written comments, will address at least three areas: One, Northern Plains has asked for as long as I can remember for an objective, fairly thorough analysis of what happens to ground water in strip mining areas, and it's important not only for livestock and for potable supply to those small users of those single-family wells, but it has an effect across the board when we decide how this proposed development, strip mine development is going to affect other things like the surface water that's 200 yards away from the mine and the creek or irrigation supplies downstream. Those kinds of things, so that ground water does have a direct tie to surface water. In many ways that's where we start looking at surface water and end up going back to the ground water to find out what's going on and find out that we don't really understand it and therefore can't draw conclusions. So we continue to ask that there be an objective, fairly thorough analysis of ground water in strip mining areas; and that request has been focused on the State. The State reaps considerable benefits from strip mining, and I think that along with that goes the responsibility to understand what we've got.

Another instance is in the Stillwater. Now the State ground water standards were mentioned by Mr. Pilcher. Those ground water standards came not so much out of an interest by the State or some sort of agenda or great concern by the State but because of a petition from the Northern Plains Resource Council to do something quickly in response to an application by the Anaconda Co. and the Stillwater to apparently impact ground water very heavily. In other words, they filed a mining permit, wanted to put in a holding pond there that appears to have direct influence on ground water, and there was no State system to deal with it and so the State wrote one, but not because they were real excited about it; because there was a petition that made that agreement that it would be done, and again it's a case of really not knowing what you're getting into. It's a problem we don't know much about, ground water.

The other instance is a real sticky one on the Poplar River where the contamination is just upstream from the border, but the impact is in the United States. It might be a ground water impact. It might be a surface water impact. A lot of studies were done generally with mirrors and mathematical models and the status that we are at now is

that our science, our monitoring tells us that there are problems there, but we would like to think that they aren't, and so so far what has gone on is that something is happening in the monitoring. There appears to be impacts there. The response was to cut back on the monitoring from quarterly to once a year and so we have no idea now what's going on there, and it's a very difficult thing because of that international boundary, but it still raises the question as to what can we do when we can't monitor? And what are we going to accomplish if we can't enforce?

So those are the areas, and we look forward to submitting our written comments for the committee and for yourself, Senator.

Senator BAUCUS. Thanks very much. Tom, one question I have is, you were talking about monitoring land-fill sites.—What are you looking for?

Mr. DAUBERT. Looking for toxics and organic or inorganic ground water contamination. Some of the land, of the landfill sites, as I understand it, are located in places where contamination will eventually affect drinking water supplies, and yet the monitoring programs existing at those sites are not adequate to protect the development of problems, certainly not in time to respond to those problems.

Senator BAUCUS. I asked the question because in looking at the Independent Record article in, I guess, yesterday's paper, Helena, apparently the body shops, auto repair shops are not violating any laws.

Mr. DAUBERT. Not at all. If that change in the law occurs, then we will have to change that practice.

Senator BAUCUS. But in the present law, they're not.

Mr. DAUBERT. Right.

Senator BAUCUS. And that means, so you are saying even if we monitor and even though there are no violations in the present law, although that might change, that it's still helpful to monitor so people know what's happening. Is that what you mean?

I'm curious. If there are no violations of the law, I'm trying to understand what should be monitored.

Mr. DAUBERT. I'm saying the law is not set up to guarantee that we don't create new problems for ourselves, and even with this proposed great improvement in the law, that is still going to be the case, and given that it certainly behooves us knowing that these places are not properly sited to be, to have, to know what's happening on the ground water resources surrounding them so we don't end up drinking contaminated water or we don't end up having no choice but to drink contaminated water for a while.

Senator BAUCUS. This goes back to an earlier question, you know. The limits with RCRA are 100 kilograms, if the bill becomes law. Looking at this article that you gave to the committee, and it's a very good article, the article points out that Oregon had a 25-pound limit. Should the State of Montana enact similar statutes? I mean to what degree is this a State question? To what degree is this a Federal question? Oregon has gone farther than the proposed Federal provision, much farther. Twenty-five pounds, that's very tight.

Mr. DAUBERT. That's right. I'm not a technical expert, so I don't have much of a basis for an answer other than just in stating my gut reaction, and how to balance the Federal responsibilities and State responsibilities is a pretty ponderous question for me to deal with.

Senator BAUCUS. It's pretty ponderous for us too.

Mr. DAUBERT. I suppose the thing that frustrates me the most as an activist on the State level is when Congress gives the States the right to go further and States like Montana in several instances denies itself the right to go further. The legislature gives, refuses to give the State agencies the right to go on further.

I know I'm not answering your question at all, but I guess I don't really have an answer.

Senator BAUCUS. Let me ask you more philosophically. Is this something that should be left basically to the State or should Uncle Sam decide, "No. It's not 100 kilograms, it should be 25?" There was a 25-kilogram amendment floating around back there for a while, and 100 kilograms came out of the compromise. I'm curious, do you think Montana has the resources to do this?

Mr. DAUBERT. I don't think it does. I don't think Montana is, of its own will, likely to provide the funding to monitor sites properly at whatever level we are going to allow small quantities.

Senator BAUCUS. Do you have any idea what it costs to monitor sites?

Mr. DAUBERT. I don't. I know it's not cheap. I guess again on an equally philosophical level, what I was trying to suggest at one point was that the existence of these substances is a fact of life, and we're not paying for the larger, the broadest social costs of those substances up front. We are allowing problems to be created that someone in most cases is going to have to pay for after the fact, and I guess on behalf of my organization, I can't suggest changes, but the kinds of things that come to my mind personally are such things as taxation sorts of systems that relate to the production of these substances to begin with.

Senator BAUCUS. You mentioned that Idaho might stop accepting Montana hazardous waste.

Mr. DAUBERT. That's the fear in our State agencies. They're sort of expecting that if that change in the law goes through, that the amount of hazardous materials will be disposed of everywhere and will greatly increase and that Idaho will then not want to accept the stuff that comes from Montana.

Senator BAUCUS. How much does come from Montana?

Mr. DAUBERT. I really don't know again exactly.

Senator BAUCUS. Does anybody know?

Mr. DAUBERT. I don't think anybody does because there's really no system in place to monitor that. Probably the site in Idaho could tell you. They are certainly by Federal law required to keep records of where the stuff comes from.

Senator BAUCUS. Could there be commercial sites in Montana?

Mr. DAUBERT. Well, the gentleman this morning was saying that geologically we would have the right kind of sites.

Senator BAUCUS. Steve Custer.

Mr. DAUBERT. Right. I have heard the opposite opinion expressed by some people in State agencies on a technical basis. I really don't know. Again, I'm not a technician. I would say that my organization is not in the least opposed to the feasibility study that the State is doing because we, you know, Mr. Custer referred to this several times this morning and that is just a notion of how frightened people get when they think of having a hazardous waste dump in their vicinity,

and they automatically react negatively to that, and there are good reasons to react negatively if enforcement and monitoring are not going to be sufficient, but on the other hand, what we have got right now is uncontrolled virtual chaos, unmonitored, unrecorded small quantity chaos, which is in the aggregate creating who knows how many kinds of problems down the road.

Senator BAUCUS. Is acquiring confidential information on pesticides from EPA a problem at all for Montana, do you know?

Mr. DAUBERT. I think it is, and I guess, I can't say information from EPA is a problem from personal experience. We have an extraordinary problem getting any information from our State Department, and the traditional reaction is to talk about trade secret clauses and requirements. We find county government can't even find out what chemicals are used within their borders from the State Department, because the State Department claims if they were to tell you what products, even on a generic basis, are being used, that that would help competition know where to target marketing programs. Getting information about pesticides is really hard.

Senator BAUCUS. That's what I thought. That's why I asked the question.

Dennis, you talked about the need for more thorough, objective analysis. Do you have any idea of how that could be done, or how do you go about doing that?

Mr. UNSWORTH. That's a good question.

The Safe Drinking Water Act set up the National Science Foundation, or the National Science Academy to do various studies of ground water. The reason for that statement is there are only certain groups who can afford to do that; and industry, with an interest to protect our Government, I guess we could add foundations with some broad interests, put them in the same category as Government possibly, but the studies that have been done, in fact one study has been done that is now used at every opportunity to give the impression that aquifers and strip mining areas will reestablish themselves and fairly quickly and things will be all better in the near term. And that study was in that case not an objective study because it cannot say that. It doesn't go through all that needs to be gone through to say that, but at the same time that is the study. It was funded by a private group, by a private corporation.

We have looked to the State to do that. The State generates a lot of its income from the resource wealth. I think along with that we have to try and understand what we've got and how we can protect it and how we can best use it.

If you've got a bank account and you want to know how much is in there, how much it draws, where you can invest it, what it's worth were I to invest it in these various places, we seem to be taking the approach that we've got it and as long as it's there, that's it. It will work for us. Well—

Senator BAUCUS. What evidence is there of strip mining in the eastern part of the State in Wyoming or other States where it has started to disturb aquifers or cause ground water difficulties.

I asked the question because we have a little experience now. We've had strip mining around for some years, and I know that was one of the big concerns with the Federal reclamation laws as well as State,

and there was even an alluvial valley provision in there to try to get out to the aquifer problem. I'm curious. Talking to farmers and ranchers down there, based upon any information you have, has it worked out, not worked out or what's the early evidence?

Mr. UNSWORTH. There is a battle that's going on between the landowner at Colstrip and Western Energy about impact ground water, and as far as I know the jury is still out on that. The landowner swears that the Colstrip complex has ruined her ground water and has not been able to convince a court of that.

Senator BAUCUS. That's the Colstrip complex? You mean the town of Colstrip?

Mr. UNSWORTH. Western Energy at Colstrip.

Senator BAUCUS. But is it the mine?

Mr. UNSWORTH. The mine. As a result of strip mining. The gross example is the Poplar River example. You can go up there and measure it or look at it today. The cone of depression is extended nearly to the border now, the area where pumping of the ground water has lowered the water table. There are at least dozens of supply wells, potable supply wells, that are gone now. There are some serious ground water quality problems all around that area, the reservoir area and the mining area, but that's a gross example. There isn't that much new water and there isn't that much water in Montana, so you can't directly relate that.

There have been proposals to do water at Colstrip and we can guess, based upon what's happened with the Poplar River there, that there will be an impact around the area.

Senator BAUCUS. Does that fall into the jurisdiction of the Transboundary Water Treaty?

Mr. UNSWORTH. No, not really.

Senator BAUCUS. Why is that? Because it only affects the quantity, not quality?

Mr. UNSWORTH. It mainly addresses quality and surface in the surface system. If you were to measure a damage, a direct injury, I think, related as surface water related to the East Poplar, then you may be able to go in and make a claim. If you were to charge that your ground water supply was gone because of that strip mine up there, I don't know where you would go.

Senator BAUCUS. OK. Thank you.

Our next witness is Bruce Bauman, soil scientist, University of Montana.

STATEMENT OF BRUCE BAUMAN, SOIL SCIENTIST, MONTANA STATE UNIVERSITY

Mr. BAUMAN. Working on a Ph. D. in soil sciences at MSU.

Senator BAUCUS. At MSU?

Mr. BAUMAN. Yes. I guess I would like to add that I received my BS in soil sciences in 1976 and spent 4½ years as a research soil scientist at Colstrip on some of the problems that we've just been discussing, so I've been a soil scientist for about 7 years.

The last 2, 2½ years ago I got into a graduate program, and my area of research has been looking at septic systems, and specifically I was, just this last summer I completed a project for the Flathead

River basin study on soil permeability in the Flathead basin and how that relates to septic systems on water quality in that particular area.

I'm a little bit surprised that the topic of septic systems hasn't come up more strongly by some of the speakers this morning. It's been alluded to by a number of them. In 1978 there was a report to Congress that pinpointed septic systems as one of the major sources of ground water contamination in the United States, and there was a recent study commissioned by the Academy of Natural Sciences just published this year that again reiterated that point that septic systems were probably one of the top two or three contaminators of ground water resources in this country.

In Montana perhaps it has not been a problem primarily because most septic system problems are a function of the density of the system, the numbers of the system, and Montana is a relatively rural State with a relatively low density of people and has not experienced those problems.

However, if I may toss out a few figures, I guess just rapidly, the State experienced a 20-percent increase in the number of septic systems between 1970 and 1980. In certain areas, the faster growing areas, for instance Gallatin County, Flathead County, Missoula County, and Yellowstone County, there was a much greater increase ranging up to a 90-percent increase in Yellowstone over that 10-year period; so in the last 10 years we have seen a very rapid increase in the number of these systems. This is a problem again based on the density of these systems, I guess, and we spent a little bit of time talking about the concepts of pollution that are created by septic systems, primarily looking at contamination from bacteria and viruses and potential human growth problems resulting from those kinds of organisms in shallow ground water supplies which often are also tapped as domestic water supplies by the same people that have those septic systems.

For the most part these are problems in areas where the systems have not been sited properly. The soils in general have a very good capability of cleaning septic system effluent. They do a very good job when the systems are sited on proper kinds of soils. Sandy soils in particular are the ones that are providing the most problems, and it's an unfortunate coincidence that sandy soils are also some of those that are most popular to build on because of their building characteristics are also very good, so we have some problems in those situations.

Phosphorus is another potential problem, potential contaminate, but again the soil does a very good job for the most part of reducing phosphorus contaminations. There have been a few situations cited in this country where phosphorus contamination of ground water and eventually surface water from septic systems has been documented.

Then in the last few years, there's been increased concern about contamination from toxic substances, some of the EPA priority pollutants primarily from cleaning, household cleaning sources people who have septic systems may use, may occasionally dump into their waste system; and these can find their way into the shallow ground water resources. Not much is known about it and usually the concentrations are relatively low, but again with the increased attention that toxics have obtained over the last few years, there is a growing area of concern.

The No. 1 thing that people or No. 1 pollutant, I guess, that septic systems produce is nitrates. Essentially septic systems provide no

treatment of nitrates that are contained in human waste systems. There is a conversion of the nitrogen compounds in waste materials from whatever organic nitrogen forms to the nitrate in almost all septic systems, and the soil has no capacity to absorb that nitrate, and so inevitably it passes through with the percolating water down to the ground water of the shallow ground water system. So I guess really nitrates are the real problem that we are facing.

There is pretty good argument going on right now as to how much of a problem nitrates are. The first consideration, I guess, is human health, and this is where the big argument lies as to what, exactly, what concentrations of nitrates poses problems to humans? Mostly it's only in small concentrations it's only a potential problem to babies. There's a specific disease that only affects infants less than 6 months old and does not affect anyone older than that, and there have been very few reported cases of that particular disease in the United States in the last 20 years, so there's some speculation that maybe the present standards for nitrates, which is approximately 45 parts per million, is too low and could be raised considerably without any adverse effects to human health.

There are some—recently, there's been a greater concern for potential long-run effects of low-level exposure to nitrates. I think most of us have probably heard about the problem of nitrate contamination or the use of nitrites in pork products, and that neither chemicals are the same. Nitrates can be converted to nitrites in the human system, so there's an increasing concern that this nitrate contamination might pose a problem from that point of view.

Outside of the human aspect of it, nitrates are a very—well, one of the major sources of leachification of surface waters, and as most shallow ground water systems are interconnected with a surface water system, there is some concern that the nitrate contamination of the ground water system will affect leachification and decrease the quality of surface waters. So those are the principal pollutants.

I think, I guess I'm concerned about this problem, especially in Montana, because I see it as a growing situation again with those statistics I quoted earlier that I think were just on the verge possibly of reaching some of those concentrations, some of those densities of septic systems that may reach the point where ground water contamination by nitrates in particular, and in some situations by bacteria viruses, may begin posing a threat to primary drinking water sources or, in some cases, surface waters. I think it is very important that the shallow ground water resource be protected for a couple of reasons, I guess. First of all, it's one that is very easy to get to, and it's a resource which can be relatively easily developed because it's closer to the surface of the earth, so the expense of getting to the water is relatively small compared to deeper wells.

It's also, for the most part, easier to find, again because it's near the surface of the earth, so you can pinpoint its location much easier, and it's just about everywhere, when you come down to it.

And I guess maybe a third reason is this resource is recharged on a faster basis, for the most part, than many of the deeper ground water reservoirs, so it's recyclable, so we can take advantage of that resource. The greatest problem with that shallow ground water resource is that it is also the easiest to pollute, so I think we need to be thinking very

seriously about looking at what those sources of pollution are, and the septic systems certainly are one, and trying to monitor the situation and see what we are looking at specifically in Montana and some of those higher population areas as far as protection of our ground water resources.

In Montana, I think, well, there is a problem in general. I guess the biggest problem I see in Montana from septic systems is basically ignorance on the part of the public officials and private individuals. I guess, in both cases, most people, I think, give very little thought to, in the past anyhow, in these areas they just haven't given it any thought. It just hasn't been a problem before, and you stated this morning that part of the reason for having this hearing now is so we can prevent some of those problems, and I see pollution caused by septic systems as one of those areas where a little bit of action right now can go a long way toward preventing future problems.

There are many areas of the United States which have experienced problems from septic systems in the past 10, 15, or 20 years, and so we can learn a lot from their experiences, and with a little bit of work, we can prevent those same circumstances from occurring in our society. So that's about all I have to say.

Senator BAUCUS. Thank you, Bruce. I'm unclear as to what causes nitrate problems as opposed to bacteria.

Mr. BAUMAN. Well, OK. The way soil treats effluents from the septic systems is primarily through the processes of filtration of large particles and absorption of the smaller particles, the microscopic and dissolved aspect of it.

Bacteria are relatively larger creatures and so soils can filter those out, very small pores between the soil to prevent them from traveling down to the water. The small pores can also in some instances prevent viruses from traveling, and it also turns out that viruses are charged particles to a certain extent, and they can be absorbed by soil particles which also have a charge to them. There are many other constituents in the effluent—

Senator BAUCUS. When you say "charge," what do you mean, magnetic?

Mr. BAUMAN. A chemical or a magnetic charge, a positive or a negative charge. For the most part, soil particles have a negative charge associated with them.

Senator BAUCUS. Negative, and viruses positive?

Mr. BAUMAN. Yes, and there are many other components in the effluent which also are positively charged, and the soil cannot absorb those. Nitrates, the nitrate molecules NO_3 , it's a negatively charged molecule and so this soil has no capacity to—like charges repel each other, so the soil cannot absorb nitrates from the water. The only place for it to go is to percolate with the effluent, with the treated effluent down to the ground water table. It takes very little soil to clean the effluent for the most part. Within 3 feet, once the effluent has passed through 3 feet of unsaturated soil, it will be purified to almost drinking water quality with the exception of nitrates. It's a very dramatic change in the quality of that effluent in a very short distance, but again nitrates, there's no treatment of nitrates in that

system. There can be a small percentage of nitrates. In some cases, nitrates can be converted to essentially gaseous nitrogen.

Senator BAUCUS. You're anticipating my next question. How do you treat each?

Mr. BAUMAN. As far as individual septic systems, there's been a number of research activities in that area and there are ways of doing it, I guess. I don't want to get too technical. I guess what you want to do basically is change the oxidation regime of the system of the soil. You want first to oxidize, have enough oxygen around so you can convert these nitrogen products to nitrates, and once they're in nitrate form, if you can stick them in an environment that has very little nitrogen, or excuse me, very little oxygen in it, then bacterial actions just, just natural soil bacteria will convert that nitrate into gaseous nitrogen.

Senator BAUCUS. Is that easily done?

Mr. BAUMAN. No. It hasn't been successfully done on an acceptable level. It has been done. The systems are very expensive, running somewhere in the neighborhood of \$6,000 to \$10,000 to do that for an individual home, and the systems need to be maintained and are prone to break down, so it's not presently right now viewed as a viable alternative to the nitrate problem.

Senator BAUCUS. How great is the problem here in the Gallatin Valley? You mentioned in the more populated areas, it's obviously a greater problem. The question is, How great a problem is it?

Mr. BAUMAN. I don't think anyone really knows. I'm not sure if it's been evaluated. I mean, most of my, I guess, research has been in the Flathead Valley, and even up there people, I think people don't know. There is one specific area in the Flathead Valley that has been targeted for a nitrate problem from septic systems. There is that one area that has been defined. I think there's been a State report or two that has expressed the concern that there has been some contamination of surface water from septic systems again through the process of nitrates eating, getting into the shallow ground water and traveling underground to the surface stream where they emerge and contribute to nitrates in that form, but I don't think there's any—if you want to look at a map of nitrate concentrations in the shallow ground water supplies in the county, I don't believe that information is available.

Senator BAUCUS. But what does your intuition tell you? How great is the problem?

Mr. BAUMAN. Well again, you have to temper that with interpretation of how much a problem nitrates really are, and I guess if you make the assumption that nitrates can be a problem, I'd say that there are probably a few instances, a few localized areas again where perhaps the density of the septic systems is insufficient.

Senator BAUCUS. Let me get back to your assumption. How great a problem are nitrates?

Mr. BAUMAN. I guess my feeling is that from the literature I've seen, I would agree that the 45 parts per million standard, if that's used as the basic for nitrate contamination, the unacceptable nitrate contamination, is too low. I think from what I've seen, well, I think some States, if I remember correctly, California has as a standard twice that

value for the last 20 years and still have no recorded case of this particular infant disease.

Senator BAUCUS. Is that the only problem is the 6-month infant disease?

Mr. BAUMAN. That was for the most part, that's the basis for instituting, from my knowledge, that particular limit, and I think that if you look at the long-term effects, that's one of those gray areas we don't know.

Senator BAUCUS. You mentioned a little action will go a long way. What little action are you talking about?

Mr. BAUMAN. I guess first of all making public officials aware of the potential problem and the ways to perhaps ameliorate that problem.

Second, from my experience with the county sanitarians in this State who are the ones for the most part responsible for siting those systems and for making the decision as to whether or not a septic system should be located in a particular area, I think there is a very great need for some kind of educational process to give those people the skills needed to more properly evaluate site conditions.

As a soil scientist, I know, well, from my experience with sanitarians, they have very little training in soil science and in looking at the soils for the first 6 feet of the soil and evaluating it for public health concerns. They are, for the most part, sanitarians are, they get a lot of training in microbiology and many other fields, and they wear many hats: they deal with county landfills, public health and restaurants and all kinds of things, but I don't think they have the tools they need to do the job that needs to be done as far as evaluating sites for septic systems.

Senator BAUCUS. OK, Bruce. I appreciate it. Thank you very much. This concludes the hearing. We will have the record left open for 2 weeks, so if anyone wants to add any additional material during this 2-week period, he or she is encouraged to do so.

The record will help our efforts. As I said this morning, this will not be the only hearing. There will be others in other parts of the country, and this is a subject which I think will be more and more of a problem as time goes on, but at least it's helpful to get an early start on it. I want to thank some people who have been very helpful, particularly Ione, my court reporter, who has put up with some of us who speak pretty quickly; in addition, Heather Wicke, who's back here with the majority staff. She's here to keep us on our toes. Second is Stephanie Clough. Stephanie is on my staff, and I want to thank you all very much for your help.

[Whereupon, at 2:40 p.m., the hearing was adjourned.]

[Statements submitted for the record follow:]



The Big Sky Country

MONTANA STATE SENATE

SENATOR DOROTHY ECK
SENATE DISTRICT 39
HOME ADDRESS:
10 W. GARFIELD
BOZEMAN, MONTANA 59715

COMMITTEES:
TAXATION
NATURAL RESOURCES

TO: Senator Max Baucus
Toxic Substances and Environmental Oversight Subcommittee
Environmental and Public Works Committee

FROM: Dorothy Eck

I come to this hearing today to express the concerns of (but not to speak for) the Environmental Quality Council and its subcommittee on water and Governor Schwinden's Ground Water Advisory Council.

The Environmental Quality Council is charged by law to develop and recommend policies to promote the improvement of environmental quality. That's a broad charge. Obviously, one of our continuing concerns is for water quality.

The Council during this interim period is considering and may propose legislation or recommendations dealing with:

- the disposal of toxic wastes, recognizing that the proposed amendments to the Federal Resource Conservation and Recovery Act would provide greater protection to our ground water but would greatly increase the responsibilities of our state Solid Waste Management Bureau.
- the clean up of designated and potential Superfund sites in Montana
- acid rain, considering the need for monitoring and prevention of long term damage to our forest industry
- ground water pollution, especially from mining and oil and gas exploration and activity and
- a comprehensive data base for both ground and surface waters.

Following a Montana Ground Water Conference in 1982, the Environmental Quality Council recommended to Governor Schwinden that a Ground water Advisory Council be appointed to develop a comprehensive ground water policy and management strategy. The Governor acted on this recommendation and this 16 member council with representatives from the legislature, state and federal agencies and the public has been working toward this end.

Both groups acknowledge that cooperation with federal agencies and programs is necessary. While Montana has strong environmental laws and policies, we depend on federal laws and programs

for much of our basic environmental protection.

A concern basic to many issues is that of rapidly declining federal support for needed data gathering, analysis, monitoring and enforcement activities. Each legislative session is faced with the unpopular necessity of picking up costs to make up for declining federal support. Despite Montana's commitment to maintaining environmental quality, it has not been possible to increase appropriations enough to adequately provide for many needed activities.

Montanans appreciate your efforts in making sure that our voice is heard. I hope it will be possible to maintain and strengthen those federal laws which protect our supply of clean water and to resist legislative or executive actions which would erode these laws and their enforcement. I hope, too, that where the state is given added responsibilities there will be added federal funding.

Testimony of Gary Fritz, Administrator
 Water Resources Division
 Montana Department of Natural Resources
 and Conservation
 Helena, Montana

for the Senate Subcommittee on Toxic Substances
 and Environmental Oversight of the Environment
 and Public Works Committee in Bozeman, Montana,
 on November 21, 1983.

We are very concerned about protecting Montana's ground-water resource. It is a well-known fact that when an aquifer or portion of it is contaminated, it may take tens of years and millions of dollars to return the aquifer to a safe, potable level of water quality. Therefore, ground-water pollution reduces the quantity of ground water available for beneficial use.

There are presently six ground-water sites designated or proposed as U.S. Environmental Protection Agency (EPA) superfund sites in Montana. These are: (1) arsenic and manganese contamination in the Milltown area ground water; (2) the Anaconda Company reducing works at Anaconda; (3) PCP and creosote contamination in the Libby area ground water; (4) the Anaconda Company refinery at Great Falls; (5) Silver Bow Creek and the associated alluvial aquifer between Butte and Warm Springs; and (6) the Rocky Mountain phosphate plant at Garrison. There are numerous other sites in the state and presumably many, many others yet undetected. A sampling of these included in the 1982 Montana Water Quality Report (MT Dept. of Health and Environmental Sciences) are phenol contamination of ground water at the Billings Exxon oil refinery; the slag piles at the East Helena ARSARCO smelter; 2,4-D contamination from the Falls Chemical Company in Great Falls; ground-water contamination at the Laurel CENEX oil refinery; contamination from gasoline storage tanks associated with gas stations in Bozeman, Lewistown, Broadus, and Conrad; and diesel fuel contamination of ground water from railroad storage tanks or spills. Just about every railroad refueling depot in Montana has a ground-water pollution problem associated with it. Over 350,000 gallons of diesel fuel has been recovered so far at the Milwaukee Road's Miles City yard. Other sites are the Burlington Northern's yards at Glendive and Livingston. Finally the past and present mining activity in Montana poses a significant pollution threat to Montana's ground water. Thousands of abandoned mines in western Montana may be currently polluting ground water, but so far studies have not been initiated to determine this. And in eastern Montana, although studies have been conducted on coal strip mining, we still cannot predict with confidence the effects of strip mining on the ground-water system.

The recent proposed EPA National Ground Water Policy was accepted by most of the states in the Western States Water Council including Montana. This policy was not adopted by the federal Cabinet Council due to former Secretary of Interior James Watt's objections. Among other things, the National Ground Water Policy provided for the states to implement ground-water management, encouraged the states to adopt a ground-water management strategy, and allowed for the federal agencies, particularly the U.S. Geological Survey, to conduct research on the states' aquifer systems and ground-water pollution sites. These recommendations were included in the Western States Water Council's resolution on ground-water management. We would like to see them remain in the EPA's new proposed National Ground Water Policy.

Early in 1983, Montana's Governor Schwinden established a Ground-Water Advisory Council whose purpose it is to create a state ground-water management strategy and adopt measures to remedy the major ground-water issues in Montana. This Council has met several times and is well on its way to accomplishing these goals.

The role of the Montana Department of Natural Resources and Conservation is to allocate surface water and ground water for a variety of uses including domestic, municipal, agricultural, industrial, hydroelectric power generation, and fish and wildlife. Most of these uses require a water source of good quality and that quality must remain good. Although the agency is not directly involved in the regulation of ground-water quality, the allocation of a parcel of ground water is relation to the quality of that ground water. What good is a water right if that water right is for a quantity of polluted ground water?

A sound ground-water management strategy and all ground-water regulation for that matter relies on detailed information regarding ground-water resources. For many of Montana's aquifers, there is no useable ground-water data. We would like to set up a plan similar to the state of North Dakota's plan, in which all the aquifer systems in Montana are systematically researched and the resultant information published in a useful form. This would be accomplished by means of cooperative funding from federal, state, and local sources. The critical aspect in this plan is the federal funding for agencies such as the U.S. Geological Survey. Because of the high cost of ground-water resource evaluations, the state cannot afford to fund these evaluations themselves. With the cooperation of federal agencies, the state and local agencies can start immediately researching all the remaining aquifers in Montana that have not been researched and continue until the task is completed. With a good ground-water quality and quantity data base, Montana can then effectively manage her ground-water resources in a manner which best serves the public.

DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES



TED SCHWIDEN, GOVERNOR

COGSWELL BUILDING

STATE OF MONTANA

HELENA, MONTANA 59620

TESTIMONY BEFORE THE UNITED STATES SENATE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

My name is Steven L. Pilcher, Chief of the Water Quality Bureau of the Montana Department of Health and Environmental Sciences. The following statement is being provided to assist this committee in addressing groundwater issues.

I would like to begin by expressing my appreciation to Senator Baucus for conducting such a hearing within our state and making the opportunity to present information available to a wider range of individuals.

Montanans, as you are already aware, have long been concerned with protecting the quality of their water resources. For many years we have had a strong program to control pollution of surface waters using water quality standards, waste discharge permits, and a strong enforcement program. The development of a similar program for groundwater has been a slow and somewhat frustrating process due to lack of groundwater quality data and other problems. The Montana Water Quality Act prohibits pollution of state water, which by definition includes underground waters. That law further requires the classification of ground waters, establishment of quality standards, and development of a permit program to control waste discharges to ground water. Late in 1982, following several years of effort, the Montana Board of Health and Environmental Sciences adopted the Montana Groundwater Pollution Control System. This regulation established quality limits for four classifications, each designed to protect a specific beneficial use. Class I groundwaters represent our highest quality

continued on next page

waters and generally are suitable for public and private water supplies with little or no treatment. Class II groundwaters are marginally suitable for public and private water supplies and suitable for irrigation of some agricultural crops, livestock watering, etc. Class III groundwaters are suitable for industrial and commercial uses, but are unsuitable for higher class beneficial uses.

The regulation then established standards which must be met to protect existing and future beneficial uses. Compliance with these standards is ensured in part by requiring a permit of any source discharging pollutants into state groundwaters.

The regulation attempts to recognize and coordinate with other State and Federal entities having groundwater protection responsibilities. Those activities or facilities currently being regulated are excluded from the permit requirements of this regulation, thus eliminating a duplication of effort. Examples of these exclusions include: 1. discharges or activities regulated under the Federal UIC program 2. solid waste management systems approved under Department of Health and Environmental Sciences rules 3. facilities employed in oil and gas field operations when approved by the Oil and Gas Conservation Commission. It is intended that the groundwater standards portion of the rule will be used by those agencies having decision-making responsibilities over activities which could have an impact on groundwater quality.

Another important section of this regulation provided the Department with emergency powers to respond to spills or unanticipated discharges of pesticides, herbicides or other toxic substances that would result in violation of Montana groundwater quality standards.

The threats to groundwater quality are widespread and varied, the most significant of which are spills of gasoline and other petroleum products, brine

waste from oil and gas development, and impacts from both hard-rock and coal mining activities. It is apparent that no one program can adequately deal with all impacts. Instead, control must be accomplished by each program doing its job and providing the protection for the area it is designed to protect.

We do not at this point need additional regulatory control. Instead, we need to concentrate our resources, whether they be financial or technical, on proper administration and application of the programs already in effect. Anything that can be done at the federal level to assist in meeting that need would be appreciated.

Thank you again for the opportunity to provide this information to you and your fellow committee members. I hope we can all work together to protect what is, without a doubt, one of our most valued resources.

20 November 1983

To: Senate Subcommittee on Toxic Substances and Environmental Oversight
of the Environment and Public Works Committee
Fr: Dr. Stephan G. Custer, Hydrogeologist *Steve Custer*
511 W. Spring Creek Drive
Bozeman, Montana 59715

Re: Testimony regarding groundwater problems posed by waste disposal.

I believe the greatest hazard to the groundwater resources of this country may well be the fact that we are making siting decisions on the basis of political considerations rather than on the basis of sound science.

To illustrate the problems that concern me, I must begin with some premises which should be clearly identified. First, the toxic and hazardous wastes already exist. This is an important premise because I believe many people are using siting of facilities to try to eliminate the production of wastes. These people are using the premise that if there are no disposal sites, then the wastes won't be generated. Nothing could be further from the truth. The wastes exist. We must find a safe means of disposing of them. We already have the problem.

The second premise is that there are safe sites or that there are sites which are much safer than others which can be used to dispose of the waste. I believe that this premise is true from a hydrogeologic standpoint. The ideal site will never be found, but good sites which minimize the hazard and contain the waste can be identified.

The third premise is that we need to find a means of disposing of the wastes in a way that will prevent interaction with the biosphere. This premise requires isolation of the material from the groundwater and surface water and atmosphere for the life of the toxicity of the materials being disposed. I suspect this requires thinking in the context of geologic time not human lifetimes.

With these premises in place I can now discuss the hazard that politics interjects into the waste disposal problems we face. An example can be drawn from nuclear waste disposal problems. While nuclear waste may not be toxic in all cases it is often associated with far more dangerous compounds than we realize and provides a pattern which I believe is relevant for the toxic and hazardous waste disposal problems of the nation. The politics of nuclear waste disposal says "Keep it out of our state." Obviously no one wants these materials in their neighborhood. No one would say, "send it here, we want to increase our risk to ourselves and our children". But if we all say no there will be no place to safely put the waste we all generate. We all use products which are toxic or produce toxic and hazardous byproducts. We all contribute directly or indirectly to the problem. We must now come to grips with the problem and do something.

Cluster 2

Presently, we are creating a dangerous situation. At a few localities in the U.S., people have for one reason or another said that waste disposal is acceptable. The sites are often not the best but rather the most expedient. We should be placing the wastes in the safest most hydrologically isolated places in the U.S., not in the most expedient place. This situation is more than a local problem. Historically, I have heard reports of the refusal of Federal agencies refusing consideration of thier land for waste disposal sites. The reasons, I suspect, have more to do with land management than they have to do with the best sites for disposal.

The best way to make the siting decisions is on a scientific basis which takes as many factors in the system under consideration as possible. All sites in all states should be evaluated generally and ranked from a saftey standpoint. Then the best sites should be identified. Once the sites have been identified, one should be selected as best in the state. No state should be allowed to say "no not here" arbitrarily. There may however be states which should never recieve wastes because suitable sites do not exist. Montana is probably not one of them.

The decision as to suitability should be made on scientific bases. The people who decide should probably not all be from the state being assessed, but some certainly should be. The scientists considering safety should not all be in the same discipline, for many aspects of the system are important. I would recommend a soil physicist who is knowledgeable in the movement of water in the unsaturated zone, a chemist knowledgeable in the area of soil-chemical interactions, a groundwater hydrologist, a geologist, an atmospheric scientist, an engineer, a botanist, a zoologist, and perhaps other disciplines which I have left out. The scientists should have demonstrated expertise in their field rather than people who claim expertise because they are scientists. This suggestion might sound like an argument for scientists to run our society. I would caution that there is no doubt that scientists make as many polictical and societal decision errors as any other group of people. I am arguing however that the reason for rejection of a site should not be arbitrary, and based on emotion, but rather should be based on sound site characteristics related to safety. By assessing sites in this way, perhaps we can avoid disposal of hazardous wastes in alluvial materials which connect to the water table and to streams as has happened in the past in Montana.

Economics is also a consideration, but should not be the driving force of site decisions. The recent MSU fire in the waste storage area was partly an economic problem. No approved site exists in the state, the costs of finding one and assessing it and providing the monitoring is too high, the costs of shipping out of state are high. We are pricing ourselves into a dilemma which we may have to buy ourselves out of at tremendous cost in the future.

When sites are found and established, we should be certain we know where we are placing the waste. I hear of nuclear waste site research projects where a drill hole accidentally encounters high level waste that no one knew existed and I sudder. These types of situations are inexcuseable but real. We must know where the waste is being disposed of exactly, and what the material at that location is if possible.

Custer 3

I am also concerned with the approach often suggested that we can correct a pollution excursion if it occurs. This technological fix comes at costs beyond our wildest dreams. The correct way to approach the problem is to do it right the first time and not gamble on the possibility that if there is an excursion we can spend many times the amount to develop the site to stop the excursion of waste into the biosphere and hydrosphere.

I am concerned with the data gathering approach that drills holes all over the site before the site is opened and thus opens the system to potential leakage down test holes, and I do not trust hole plugging very much. A research area can be made a sieve and actually make the system more susceptible to hazards of leakage.

Finally, I believe we need a site in every state to reduce transportation costs and transportation hazard and to encourage people to use the site. None-the-less there are states which probably have no suitable site because of hydrogeologic factors. The sites should be safe first and then transport distance should be minimized. The lower cost we make the site to a user, the more likely it will be used. I am concerned with the attitude that the user should pay for the site. All of us will benefit if the site is used, and the best way to insure use is to keep use-fees low. Transportation of waste is a big cost and should not be ignored.

You may be wondering where in Montana a waste disposal site should be installed. I do not wish to prejudice a site or cause political furor, but the state has bentonite beds thick enough to mine to line pits to prevent leakage. If such deposits exist naturally, then surely we should be able to find a bentonitic locality which could contain hazardous waste. The same situation exists in states adjacent to Montana. I suspect sites are not so rare as we think if we can just get past the political furor, and get to work.

Steve Hooker

November 21, 1983

Testimony of the Montana Environmental Information Center,
PO Box 1184, Helena, MT 59624

Before the Senate Subcommittee on Toxic Substances and Environmental
Oversight of the Environment and Public Works Committee

My name is Tom Daubert, and I am Assistant Director of the Montana Environmental Information Center. On behalf of the 1,500 members of my organization, I would like first to thank you, Senator Baucus, and the other members of your subcommittee, for taking the initiative to come to Montana to hold hearings on critically important groundwater issues.

We are all fast realizing just how important groundwater protection is. The challenges we face as a result of this growing awareness are first to develop policies that can effectively prevent new instances of contamination, secondly to develop procedures for thoroughly monitoring the potential problem areas that we have created already through the ignorance of past practices, and thirdly to clean up known contaminations, where possible.

Of course, as in so many areas of environmental concern, one of the biggest problems we face is a lack of meaningful baseline information about the quality and behavior of our groundwater resources. As a result, we continue to make policy decisions on the basis of theoretical understandings that are weak at best. For example, Montana's Department of Health and Environmental Sciences roughly a year ago adopted rules to implement its groundwater nondegradation policies--and in essence the rules are built around allowing new groundwater contamination within a so-called "mixing zone," beyond the boundaries of which no degradation is supposed to occur. What that means is that groundwater can be legally contaminated on a site-specific basis, and we as a society are just going to hope that in every place where we allow such degradation, the contaminants will become acceptably diluted as they spread. The wisdom of such a policy obviously depends upon whether or not groundwater actually does mix and become diluted--which is something, the technical experts tell me, that we can't be sure happens, or something that might happen in some places but not in others. Another obvious problem involved in this approach concerns how we determine the size of a "mixing zone," and how we ensure thereafter that the needed amount of mixing occurs within that zone, so that adjacent property does not become contaminated.

It would be anyone's guess what sorts of future contamination problems we may be about to create through this policy. My point is that research on groundwater behavior--particularly as regards the site-specific questions of dilution, absorption and containment of contaminants of various kinds--should be a priority. Unfortunately,

as officials from the Bureau of Land Management told our state Legislature's groundwater advisory committee just last week, recent cutbacks in federal funding for groundwater research will only frustrate our ability to collect the knowledge we need.

A related priority, in my view, would be for us to refuse to enact new policies that can't be supported by an educated understanding of our world. Certainly, we should refuse to delude ourselves by enacting policies that go so far as to fly in the face of what we otherwise know.

Perhaps more than any other environmental matter, the problems surrounding toxics and groundwater protection illustrate the correctness of the essential message of the environmental movement itself. That message is that we can't afford--on any basis, economically or otherwise--to pretend that what we know isn't true. The old adage, "out of sight, out of mind," has no responsible place in natural resource policymaking; to imagine that what we can't see with our naked eye--that what merely seems to be invisible--is invisible and irrelevant, is the height of stupidity. The many toxic groundwater contamination disasters nationwide have proven beyond a doubt that an ounce of prevention is both cheaper and safer than even a hundred pounds of cure.

We may face a new--and more widespread, if as a rule less dramatic--threat of this sort with respect to groundwater right now. I refer to the situations that we have allowed to develop--and that we now hope to reverse--as a result of the definition of a "large quantity" hazardous waste generator contained in the Resource Conservation and Recovery Act, now up for Congressional reauthorization.

The Montana Environmental Information Center would like to formally and publicly commend you, Senator Baucus, along with other members of your committee, for voting recently to recommend a lowering of that large quantity generator definition. Presently, the law only requires those who generate more than 1,000 kilograms per month of hazardous wastes to dispose of their wastes at properly designed and monitored sites. The full Congress will soon vote on your committee's proposal to lower that to 100 kilograms per month. The unfortunate aspect of this important proposed improvement in the law is that it represents an acknowledgement of the fact that our present practice is potentially very dangerous and may prove extremely costly.

Right now, in Montana as elsewhere in the nation, our county landfills are accepting so-called "small" quantities of toxic and hazardous substances--and in the aggregate these small quantities likely pose long-term threats to our environment and to public health, primarily through the likelihood of inevitable groundwater contamination. Local landfills are not properly designed or sited for the containment of toxics. Neither is the receipt of toxic materials at these sites adequately recorded. Perhaps most importantly, our groundwater monitoring programs at many of these sites are not sufficient to guarantee adequate advance warning of impending contamination of groundwater and public drinking supplies. There are too many unknowns

for comfort in this situation. What we do know, however, is that monitoring wells at some of Montana's landfills have begun to show the spreading of organic contamination of water, and so it would appear to be only a matter of time before the toxics contained at some of these sites begin to create more serious problems.

My point is that while your vote in committee to support a lowering of RCRA's large quantity generator definition represents an important service to Montana and the rest of the nation, it seems critically important that Congress recognize that we will not entirely solve the problem by changing that definition. I see a great need for state and federal governments to fund improved groundwater monitoring programs at regular landfill dump sites, and to develop strategies that will expedite government's ability to react if and when serious problems are discovered.

I would like also to briefly address some of the "Catch 22's" inherent in pest and weed control here in Montana, because they also relate to the dangers of widespread groundwater contamination. I should mention as a preface to these comments that besides working for the Montana Environmental Information Center, on my own time I serve as a member of the Lewis & Clark County Weed Control Board.

About a month before my county commissioners appointed me to the Weed Board, members of our county weed control crew were observed spraying a mixture of tordon and 2,4-D directly into Ten Mile Creek. Fortunately, the spraying occurred downstream from where the City of Helena takes its water supply out of Ten Mile, but the spraying violation was nevertheless a very serious one. One reason for the seriousness of the violation, in my view, is that federal law has not permitted the deauthorization of tordon, despite the fact that that chemical was originally approved on the basis of data that we now know was invalid, supplied by the same people who were recently convicted in federal court of scientific fraud and conspiracy. In effect, the safety of that chemical as well as others, and the facts surrounding its benefits and costs, have yet to be established; functionally, the intent of federal pesticide laws has been subverted.

In the course of the Weed Board's investigation into the Ten Mile incident, we were informed by the state Department of Agriculture that the tordon label requires that it not be applied in places where groundwater is shallower than ten feet. To me, this means that anyone who uses tordon without a firm knowledge of area groundwater resources is in clear violation of federal law. For such entities as county Weed Boards, I would think a map of groundwater depths would be needed--at a minimum--for a tordon application to be legal. Yet to my knowledge, no one who uses tordon--and tordon is routinely used throughout Montana and the nation--even stops to think about groundwater. In fact, in my two years of work on a variety of pest and weed control issues, I have yet to see evidence that the average user of any pesticide thinks carefully about protecting surface water, much less groundwater.

I would suggest that the groundwater protection requirement on the

tordon label is there for a reason--and a good reason at that. If anything, we know that the federal agency responsible for pesticide labelling has not been in the habit of erring on the side of caution, so the discovery that label instructions are being ignored is cause for genuine alarm. The serious problems involved in trying to enforce pesticide laws make the situation all the more important. Nationwide, we may face serious site-specific groundwater contamination problems resulting from the misuse of chemicals that is occurring today.

One of the continuing themes of my testimony concerns the inadequacy of environmental monitoring and enforcement programs on both the state and federal levels. Overly tight budgets are the principal cause of this. The solution, I believe, lies in owning up to the truth that an ounce of prevention is worth a pound of cure.

A related problem my comments have touched on concerns the fact that when the federal government authorizes state agencies to implement federal programs and standards, all too often the federal oversight agencies do an inadequate job of making sure the state programs perform satisfactorily. For example, GAO has several times over the years conducted studies documenting serious inadequacies in state implementations of FIFRA, the Federal Insecticide, Fungicide, and Rodenticide Act, and yet to my knowledge neither Congress nor the EPA has yet acted on those important findings.

Senator, I want to thank you again for this opportunity to testify. I hope my comments on some of the groundwater protection and toxics issues that the Montana Environmental Information Center has been working on will be of use to your committee. Please feel free to have your staff contact us with any questions that our comments may raise for you or other members of the committee.

Comments from the Northern Plains Resource Council
to the
Senate Subcommittee on Toxic Substances, Committee on
Environment and Public Works

December 7, 1983

The Northern Plains Resource Council (NPRC) is a private, non-profit organization of farmers, ranchers and other citizens concerned about the effects of large industrial development on agriculture and rural communities in Montana.

NPRC's work in energy and mine development issues often involves groundwater protection and contamination issues. That experience leads to the following conclusions:

- 1) Disposal and holding ponds leak and leakage has an effect, both on surface and on groundwater. Groundwater contamination affects stockwater, irrigation and private potable supplies. As groundwater moves into surface systems, the whole range of beneficial uses can be impacted.
- 2) The groundwater issue is poorly understood -- witness the continuance of "out of sight, out of mind" solutions to waste disposal problems and the difficulty in developing workable control regulations.
- 3) Government at the state and federal levels haven't carried through with monitoring and enforcement funding for programs that are otherwise approved and often highly-touted.

A summary of three illustrative cases follows.

Colstrip Surge and fly ash ponds at the Colstrip power plant complex in Southeast Montana have long been a concern to ranchers in the area. They leak, contributing to waterlogging on one hand and increased salinity and trace elements in groundwater on the other.

(cont.)

December 7, 1983

NPRC Comments--2--

The state agency with jurisdiction says that "adequate" monitoring is being done, although it has received no regular monitoring reports, nor has it conducted compliance monitoring.

Ranchers downstream from the surge pond charge their hay meadows have been ruined by waterlogging. Groundwater in the fly ash lagoon area appears to have poisoned vegetation. These problems likely will magnify as the project matures.

Construction has begun now on a new 356 acre fly ash pond to hold 16,500 acre-feet of sludge. NPRC contested the adequacy of the monitoring program and is involved in an ongoing dispute over interpretation of conditions placed on approval of the project in 1976. These conditions state, in relevant part:

That the seepage from the existing surge pond or any additional surge ponds be monitored, as specified by the State Board of Health, and that every feasible engineering means be taken by the applicants to minimize seepage.

That the sludge pond (fly ash) or ponds shall be completely sealed. If the conventional means . . . do not seal the pond(s), as indicated by monitoring wells the applicant shall install and operate, then extreme measures even up to complete sealing by a plastic membrane shall be taken.

Although the language seems clear in its intent, apparently it isn't. Project sponsors claim that the existing and proposed ponds may legally leak about 100 gallons per minute. They refuse to install a plastic membrane, due mainly to cost. Water in the new pond is projected to range up to 29,000 ppm TDS (total dissolved solids, or salinity). Impacts from decisions made today will have effects over the next several decades. Damage to groundwater is not easily undone.

Stillwater County Montana agreed to develop regulations to protect groundwater as settlement of a dispute with NPRC and its affiliate, the Stillwater Protective Association. The dispute arose over potential groundwater pollution from Anaconda Company mining operations in Southern Stillwater County. The Montana Department of Health and Environmental Sciences proposed rules in 1981, but then backed away from those rules because of a lack of resources to administer the rules, a lack of survey data to classify groundwater and because of critical comments from industry. In addition, NPRC was informed that the Department was unable to meet time-frames laid out in their agreement. Finally, in 1982, the rules were adopted in a pared-down form with reservations expressed by most who commented on them.

One controversial area in the new rules is the allowance for a mixing zone, an area of groundwater allowed for dilution of pollutants. As defined, the mixing zone can extend throughout property owned by the developer. It is possible that polluters will find it cheaper to buy land adjacent to groundwater pollution sources rather than control pollution. This will only intensify a future pollution problem. In addition, enforcement by state agencies has been described as "weak-kneed". Personnel simply aren't available to monitor and enforce environmental regulations.

(more)

December 7, 1983

NPRC Comments--3--

Poplar River Private and government interest at all levels was sparked in 1975 when a Canadian Crown Corporation, the Saskatchewan Power Corporation (SPC), gave notice and then immediately proceeded to construct a power complex including a large earthen dam, cooling water reservoir, strip mine, thermal-electric power plant and ash disposal lagoons. All this is within 4 miles of the International Boundary on an International stream, the Poplar.

The water quality debate that followed SPC's action involved a report of considerable volume and the time of dozens of scientists, technicians, policy-makers and bureaucrats, local government officials, farmers, ranchers, housewives, business people and other citizens from two countries. The result of that effort, in part, is a substantially redesigned ash lagoon system and an extensive monitoring plan. That plan includes a bi-lateral (U.S.-Canada) monitoring committee. After nearly 3 years of effort which, on the whole, has been productive, that plan now is approaching a dead end.

Ironically, at the same time the project is being brought up to full power and commercial operation, funding for planned basic monitoring programs has ended. Today, there is no U.S. monitoring on the Poplar River.

Canadian groundwater test wells began to show problem levels of some contaminants soon after SPC started pumping ash into the lagoons. Now, nearly two years later, officials are still at a loss to explain the increases. Monitoring in Canada was cut from quarterly to annual samples and the monitoring that has been done isn't reliable. What's more, complaints are now coming from the bi-lateral monitoring committee that their reports aren't being heard at the federal level.

The problem is an important one because the contaminants involved clearly present health hazards. Large amounts of ash (1500 tons/day) go into the lagoons and the ash is particularly dirty, with high levels of uranium, lead and other constituents. The lagoons are upstream from the city of Scobey's municipal supply system. Contamination of groundwater at the lagoon site could conceivably find its way into the city supply system.

These examples are cited to illustrate a portion of groundwater-related experiences over the past decade in Montana. NPRC continues work on groundwater contamination and protection issues on a day-to-day basis with our affiliates around Montana. In addition, NPRC actively supports funding for government agency environmental monitoring and enforcement and continues to press for an unbiased, well-thought study of groundwater impacts in strip mine areas.

GROUND WATER CONTAMINATION

TUESDAY, NOVEMBER 29, 1983

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON TOXIC SUBSTANCES AND
ENVIRONMENTAL OVERSIGHT,
Washington, D.C.

The subcommittee met at 2 p.m., in room SD-406, Dirksen Senate Office Building, Hon. Dave Durenberger (chairman) presiding.

Present: Senator Durenberger.

OPENING STATEMENT OF HON. DAVE DURENBERGER, U.S. SENATOR FROM THE STATE OF MINNESOTA

Senator DURENBERGER. The hearing will come to order. Good afternoon everyone, and welcome to our hearings on the problems of ground water contamination. The subcommittee intends to have additional hearings to fully explore the nature and extent of ground water contamination and the role of Federal, State, and local governments in dealing with the problem.

Today might be characterized as educational for all of us. Its purpose is to review those actions that the U.S. Environmental Protection Agency has taken in response to the growing concerns in this country surrounding the issue of ground water contamination. We also will assess the role of the new Agency for toxic substances and disease registry as it relates to health threats to persons drinking contaminated water.

Ground water supplies 40 to 50 percent of the population of this country with its drinking water and provides the vast majority of water used for irrigation. It is threatened by an array of toxic chemicals and unlike surface waters, once contaminated, ground water is incapable of cleansing itself.

The reports of ground water contamination have sharply increased during the past decade. Thankfully, however, we have to date been spared more widespread or destructive impacts from ground water contamination. Therefore, it would appear that we have the opportunity to learn from our experience and to act to preclude future instances of contamination as well as to correct the damages done by the past.

Today's hearing is structured to address these issues. We have selected several major sources of ground water pollution in order to better understand the magnitude of the contamination problems, the reasons for contamination and the proper role of the Federal Government. Finally, we will hopefully define some ways for avoiding repetition.

First, we will look at the problems caused by ground water contamination from the use of pesticides, specifically aldicarb and ethylene dibromide.

EDB has contaminated ground waters in California, Florida, Georgia, and Hawaii—contamination which in some cases has resulted from legal use of this chemical as a soil fumigant, as approved by EPA. In response to intense public pressure, EPA acted last month to restrict the use of EDB, but this was after California and Florida had already moved to suspend agricultural uses of EDB in those States.

Similarly, aldicarb has contaminated ground waters in nine States—most seriously in New York, Florida, and Wisconsin. On Long Island alone, aldicarb has been detected in hundreds of wells.

Questions that come to mind are why EPA registered these pesticides for uses that have resulted in serious contamination in ground water, and what action should the agency take to prevent further contamination by these and similar pesticides.

Second, we will look at the contamination problems posed by surface impoundments. EPA's draft surface impoundment assessment estimates that there are 180,000 surface impoundments across the country, many implicated as a major source of existing ground water contamination, as evidenced by their being a leading cause of contamination at priority Superfund sites. We want to better understand what these 180,000 surface impoundments contain, the magnitude of the threat from these impoundments, and what EPA intends to do to minimize threats of ground water contamination from them.

Third, we will examine the extent and nature of contamination of ground water with the industrial solvent trichloroethylene or TCE, which I will undoubtedly continue to call it. TCE is an animal carcinogen and probably the most frequently detected synthetic organic contaminant of ground water. TCE has been found in drinking water wells in Long Island, New York, California, and numerous other sites across the country, including Minnesota.

In January 1980, California closed 39 public wells supplying water to more than 400,000 people in 13 cities in the San Gabriel Valley because of TCE contamination. One of the other sites is of special concern to me because it involves the 22,000 residents of New Brighton, Minn.

Finally, we will explore the emerging problem of ground water contamination from leaking underground storage tanks. This problem includes tanks used to store gasoline and other fuels, as well as chemical products and wastes. We are confronted with increasing instances of drinking water wells being closed, contaminated by chemicals leaking from the estimated 1.2 million underground storage tanks throughout the Nation. EPA will testify today that 75,000 to 100,000 of these tanks are leaking 11 million gallons a year and just one of those gallons will pollute the water supply of a 50,000 person site to 100 parts per billion.

This number surely will rise dramatically if tanks are not replaced. California, just this year, enacted legislation establishing a permit monitoring program for underground storage tanks acting in response to evidence of large numbers of leaking tanks throughout that State.

Gasoline raises an especially troublesome issue because of the enormous volumes stored in underground tanks, usually located in heavily populated areas, and we must better understand the nature of that problem.

Our panel today represents those offices of EPA that administer programs relevant to addressing these ground water contamination problems. We all recognize that no single law has been enacted to protect against ground water contamination. Instead, a variety of laws have been enacted affecting this problem. The urgent question then is whether EPA can effectively address these problems under those numerous environmental statutes that EPA now administers. If it can, why isn't it? If it can't, does the fault lie elsewhere than in the law or in the agency itself? Does the fault lie with budget? Does the fault lie with other levels of government or agencies of the Government? Does it lie with our knowledge base? What is it? And how can we help?

We may identify gaps in the statutory authorities needed to protect ground water and if that is the case, then together we must consider whether legislative action is necessary and, if so, what kind is necessary to fill those gaps.

Answers to some of these questions may be in the EPA ground water policy or strategy which has been often discussed though never yet revealed. I understand this policy or strategy was originally prepared more than 3 years ago. I don't know whether it has suffered the problem of too many cooks in the kitchen or inadequately heated oven, but this policy or strategy is still in the oven and not done yet, although the Administrator tells me we may have an occasion in a couple of months to pull it out of the oven.

I look forward then to exploring with the witnesses today all of these troubling issues and perhaps some others that I haven't mentioned that may come up in the course of the testimony, the issues of ground water contamination. And I also look forward to working with each of you and with everyone who has expressed enough interest in this subject to be at this hearing today so that together we can establish an effective program to protect the ground water of this Nation.

Our witness list today is five persons in number: Jack Ravan, who is responsible for the Clean Water Act and Safe Drinking Water Act at EPA, who is also no stranger to these issues. He was an EPA regional administrator in Atlanta for 6 years in the early 1970's; Dr. John Moore is responsible for pesticides and toxic substances programs at EPA. He has 20 years experience in toxicology and over half of that is in the Government; Dr. Bernard Goldstein is responsible for EPA's research and development program. He has a strong background in environmental medicine; Dr. John Skinner is responsible for EPA's hazardous waste regulatory program, and he is here today because Lee Thomas is engaged elsewhere, I believe, in OMB, which seems to take everybody's priorities these days.

And finally, our fifth witness is Dr. Vernon Houk, who is responsible for the agency set up by the Superfund law to track populations of people exposed to toxic substances. Dr. Houk was with the Center for Disease Control for 14 years and is now Director of the Center for Environmental Health.

Several of you people are recent confirmees, and I understand this will be your first hearing. I appreciate the fact you all came out. I understand Jack is going to carry the ball and give us the EPA statement, and then we will go to any other comments anyone might have and then to my questions.

STATEMENT OF JACK E. RAVAN, ASSISTANT ADMINISTRATOR FOR WATER, ENVIRONMENTAL PROTECTION AGENCY, ACCOMPANIED BY JOHN A. MOORE, ASSISTANT ADMINISTRATOR FOR PESTICIDES AND TOXIC SUBSTANCES; BERNARD D. GOLDSTEIN, ASSISTANT ADMINISTRATOR FOR RESEARCH AND DEVELOPMENT; AND JOHN SKINNER, DIRECTOR, OFFICE OF SOLID WASTE PROGRAMS

Mr. RAVAN. Thank you, Mr. Chairman. My name is Jack Ravan. Since you have done an eloquent job of introducing our Environmental Protection Agency team here this afternoon, I shall skip over the first part of my statement and move directly to comments that we would like to offer to the subcommittee this afternoon.

Ground water is, indeed, becoming an increasing problem. Although pollution of underground sources of drinking water was recorded over 50 years ago, hydrogeologic experts assume that such pollution involved only very water soluble chemicals, and that the various layers of soil, rock, and clay that overlay aquifers provided a satisfactory protective barrier. Specifically, it was thought that chemicals, for instance, would bind to the soils and that they would not reach the ground water or be carried along through it. While this is true for some chemicals in some soils, we now know that most chemicals, especially the solvents, are attenuated very little in these soils and in most types of soils.

In light of this new understanding, EPA has begun to put its regulatory authorities, its research initiatives, and its technical assistance capability to work to protect public health and the environment through protection of ground water quality.

The following figures serve to illustrate the breadth of our challenge: As of 1980, the principal uses of ground water were irrigation, 67 percent; public drinking water, 14 percent; self-supplied industrial water, 13 percent; and rural households and stock watering, 6 percent. In real terms, approximately 112 million American obtain all or part of their drinking water from these underground supplies.

It should also be noted that reliance on ground water is increasing as a proportion of all fresh water used. This is in part due to population growth, but also due to a greater per capita use. Since 1950, there has been nearly a threefold increase in ground water withdrawals.

Senator DURENBERGER. My copy of your statement—I was promptly going to ask you a question—because it says fortyfold increase in ground water withdrawals.

Mr. RAVAN. That is a typo, sir. It is threefold, not 40.

Use of ground water is ever increasing and threats to ground water quality is also on the rise. The list of existing and potential sources of contamination is very long. The following are considered among the most important and are frequently cited causes: Underground storage

tanks, septic systems, surface impoundments, landfills, hazardous waste disposal sites, agricultural practices, especially with regard to pesticides and fertilizers, road deicing or salt, injection wells, transportation spills, oil and gas exploration, brine disposal, salt water intrusion caused from overpumping, animal feedlot waste disposal and, lastly, certainly not least, illegal disposal of toxic chemicals and underground pipelines.

The contaminants of principal concern from many of these sources include gasoline, which contains benzene, ethylene dibromide, [EDB], mentioned by you, Senator, and ethylene dichloride, organic chemicals, and solvents, trichloroethylene [TCE], trichloroethane [TCA], benzene, heavy metals—cadmium, lead, chromium, mercury—inorganics—chemicals—ammonia, cyanide, road salt—pesticides—ethylene dibromide, dibromochloropropane [DBCP], 1,2 dichloropropane [DCP], aldicarb, and a variety of other hazardous and nonhazardous wastes.

Gasoline may be one of the most common causes of ground water pollution in many parts of the country due to leakage from these underground storage tanks. For example, the State of Maine has estimated that of the 5,000 active service stations in the State, 25 percent have leaking storage tanks. The estimated annual underground leakage approaches 11 million gallons. Experts in the field have estimated that nationwide there may be between 75,000 and 100,000 leaking tanks at this time, and the number is rising.

The potential for contamination from this single source is not small. One gallon of gasoline per day leaking into a ground water source is enough to pollute the water of a 50,000-person community to a level of 100 parts per billion.

As this background illustrates, the causes of ground water pollution are complex and widespread. They crosscut several of EPA's regulatory programs. At this point, I would like to review the statutory authority of these programs as they relate to this ground water problem.

The Comprehensive Environmental Response, Compensation and Liability Act of 1980, known as CERCLA, established a trust fund, a Superfund, to finance Government responses to releases or threats of releases of hazardous substances that may harm human health or the environment.

The agency has identified 546 hazardous sites to date as candidates for remedial action. Four hundred of these pose some threat to underground sources of drinking water. Some form of action has been taken at 141 of these sites. The agency has also taken removal action at 218 sites, 58 of which threatened ground water.

Under subtitle C of the Resource Conservation and Recovery Act, RCRA, EPA has promulgated regulations which provide "cradle to grave" management of hazardous waste. Operators of land disposal facilities, approximately 1,400 of them, are required to monitor for potential ground water contamination. New facilities must have underliners and leachate collection systems. Corrective action is required in the event of ground water contamination at permitted facilities.

The agency has made enforcement of ground water provisions of RCRA a very high priority after determining that initial compliance rates with monitoring requirements were indeed poor.

Ground water protection under the Safe Drinking Water Act is implemented through drinking water regulations, underground injection control regulations and the sole-source aquifer program.

At present, there are drinking water standards which establish maximum contaminant levels for 10 inorganic chemicals, 10 organic chemicals, including 6 pesticides, microbiological contaminants, radionuclides, and other contaminants found in ground water. In addition, there is a four-phase plan for promulgation of new regulations.

Under the underground injection control program, underground injection of materials that pose a threat to ground water is regulated. This program insures that injection well activities do not endanger present and future sources of drinking water.

Senator DURENBERGER. Let me stop you at that point. That last sentence is not a typo, "This program insures that injection well activities do not endanger present and future sources of drinking water"?

Mr. RAVAN. That is right.

Senator DURENBERGER. Some time in the last 2 or 3 months when we were marking up RCRA, I recall being bothered by this problem because something in excess of 50 percent of waste disposal is being done by this kind of injection program, and I recall asking EPA for information on deep-well injection. I recall asking for information on the number of injection wells, their location, the type of waste, the type of drinking water supplied, where they were located, and I think I recall getting an answer saying we don't know. How is it that you can insure that injection well activities do not endanger present and future sources of drinking water when you can't even supply that kind of information?

Mr. RAVAN. Senator, I think I can agree to provide that information in the future as the program is implemented, and I call on John Skinner to help me here. A permitted injection well should, in fact, be permitted to the extent that it should not endanger and that is the intent of my statement, John.

Mr. SKINNER. I think that is correct. I think we do have information and have supplied it to the staffs on the number of wells and their location. We do not have information—complete information—on the design and operation of each of those wells, and we are attempting to get that right now.

I think that the statement meant that if those wells were in compliance with the standards that we set, they would be operated safely.

Senator DURENBERGER. What is the process of getting information? Is it a from-scratch process, or is there a body of knowledge already existing somewhere on all of these wells and all you have to do is gather it together?

Mr. SKINNER. We recently completed a survey in all of our regions in the injection well program in each of the States and are pulling that together now. In addition to that, we are obtaining information from State records on what they have, and we will compile that all together and put a report together on the status of the underground injection programs in several months.

Senator DURENBERGER. Do you have the answer to another related question which goes back a paragraph to the four-phase plan for promulgation of new regulations? What is the time line on coming

up with those regulations? I can't tell by reading the CFR, so I ask you that question.

Mr. RAVAN. On the four-phase plan for drinking water standards? Senator DURENBERGER. Right.

Mr. RAVAN. Yes, sir, we can provide you information on that.

Senator DURENBERGER. Does anybody know off the top of your head? Do you know off the top of your head?

Mr. RAVAN. Through phase III, we have in fact gone out with a notice to say what we wanted to do. If you will give me just a moment, I can give you compete details.

Senator, why don't I let Joe answer the question for you.

Senator DURENBERGER. Sure, come on up, Joe. Identify your name and position for the record.

Dr. COTRUVO. My name is Joe Cotruvo, Director of Drinking Water Standards Division in the Office of Water. My Office is responsible for developing those standards, and we are at several different points along the way, depending on which phase. The first phase deals with the volatile organic chemicals, trichloroethylene—that group. It has gone through advanced notice. It is approaching proposal stage for recommended values and that is expected after the first of the year.

The second phase deals with the vast bulk of chemicals, organics, pesticides, inorganics, micro, also. That is currently in an advance notice stage, was published in October, and the proposals for the recommended values is anticipated at the end of 1984, September 1984.

The third phase is the following year, and the fourth phase comes the following year.

Senator DURENBERGER. That is 1985 and 1986?

Dr. COTRUVO. Yes.

Senator DURENBERGER. What is the final stage in the process? You have given us some dates now.

Dr. COTRUVO. As you know, the process is quite lengthy. The way the Safe Drinking Water Act is written, there are two sets of regulations that have to be promulgated. We must propose recommended maximum contaminant levels, these are the goals. Then those are promulgated, and then we propose the actual standards and then those are promulgated. That whole process tends to be on the order of 2 to 3 years.

Senator DURENBERGER. I just want to be sure on your 1984, 1985, 1986 timetable, that was for the promulgation of standards?

Dr. COTRUVO. On the phase I. The February date for next year was proposal of recommended value—proposal. Promulgation at the end of the year.

Senator DURENBERGER. Follows that by how much time?

Dr. COTRUVO. Approximately a year.

Senator DURENBERGER. Would that be true generally in the case of each of these phases?

Dr. COTRUVO. Generally; yes.

Senator DURENBERGER. And then the final step is how long after that?

Mr. COTRUVO. Approximately another year. It is approximately a year from proposal of recommended values to promulgation, and then approximately a year from promulgation of recommended values and

proposal to promulgation of actual standards. And then beyond that, there is a delay before they become effective, and that is specified in the law, of 18 months.

Senator DURENBERGER. Thank you.

Mr. RAVAN. I must confess, Senator Durenberger, as I witnessed your expression, I have been impressed that this process is so lengthy and that it, in fact, involves a five-step procedure in each of four phases. If one is not careful, you could quickly multiply 4 times 5 and get 20 years for this work. We hope and pray that is not the case. It is lengthy, however, and I can see a situation where phase IV of this program would, indeed, lead us to 1987, and any court challenges or the like along the way with any of those phases might, indeed, throw us later than that. And this first version of the Safe Drinking Water Act was passed in 1974. So it is not without trial and tribulation that this program is now at this stage of development.

In preparing for this hearing today, I am prepared to report to you that present staff and their commitment to that schedule, I think, is deep and one I am certainly committed to holding to.

Should I proceed now?

Senator DURENBERGER. Yes; I think you are at the sole-source aquifer program.

Mr. RAVAN. This program, sole-source aquifer program, permits citizens to petition EPA for designation of an area as a sole source if it is a principal water supply. To date, 11 aquifers have been so designated and an additional 22 petitions are being reviewed. This designation provides for EPA review of all federally funded projects that may affect the quality of ground water in a sole-source aquifer.

Then the Clean Water Act provides for State water quality management programs that may address ground water.

The Federal Insecticide, Fungicide and Rodenticide Act [FIFRA], is a licensing statute which permits EPA to restrict the use of hazardous pesticides and to cancel or suspend the registrations of pesticides that pose a risk of unreasonable adverse effect to humans or the environment. FIFRA gives the agency significant discretion in dealing with possible contamination of ground water by pesticides. The Agency has restricted products because of their potential to leach into ground water. Further, the EPA can and has suspended product registrations because of this occurrence.

The Toxic Substances Control Act [TSCA], addresses ground water contamination issues under three sections—section 4, test rules; five, premanufacture notification for new chemicals; and section 6, existing chemicals.

Under section 4, the Agency may require testing of chemical substances to determine whether they pose unreasonable risks to human health or the environment.

Under section 5, manufacturers of chemicals are required to notify the Agency before beginning production of new chemicals or before beginning production of a chemical for a significant new use.

Under section 6, the agency can take various regulatory actions against chemicals which present an unreasonable risk to human health or the environment.

In addition to these regulatory authorities, the EPA conducts a research program to provide a broad range of data and information

for use by decisionmakers concerned with ground water protection. The ground water research program is directed toward improving monitoring technology, prediction and assessment tools and aquifer clean-up methods. Other research programs also contribute to the scientific basis on which decisions about ground water protection are made. For instance, a significant portion of the research on the health effect and removal of drinking water contaminants is directed toward chemicals found in ground water.

Research to develop and evaluate technology for control of sources, such as surface impoundments, and improvements in methodology for analyzing water samples for trace constituents also contribute to our scientific capability. Quality assurance is always an important facet of any investigation, including those involving ground water and thus it remains a very high priority in our research agenda.

Despite these authorities and activities, many of the known sources of ground water pollution are not specifically addressed by EPA's present regulations. At this time, we are assessing the feasibility and appropriateness of using these statutes to address currently uncontrolled sources, surface impoundments and underground storage tanks which hold nonhazardous wastes, gasoline products and process solvents. While some of these can be regulated, some cannot be, and some should not be. In addition, we are looking at methods of assisting States to address these and other ground water problems.

Beyond these Federal authorities, States have regulated many of the more ubiquitous and common sources of contamination. It is important to understand that States have traditionally stood as the first-line authority on ground water protection, and they continue to do so today.

Senator DURENBERGER. I wonder if I could stop you again at that point, Mr. RAVAN. In the year or so that I have been on this committee, I have had occasion to draw on my background and concern for our intergovernmental system and how well it works or doesn't work, and also to understand that in the area of environmental regulation it really has been traditional that the States have been on the front lines, so to speak, and in effect they have come to the Federal Government asking for a variety of assistance in the areas they can't handle by themselves. Some of them are fiscal disparity reasons; some are the fact you can't do 50 research projects and have them come out economically, and I think others are because of the nature of pollutants and the inability of the economics of one's State.

Having just been through the example of the gasoline tanks and underground storage and surface impoundments and agricultural runoff and road deicing and over-pumping of aquifers and a wide variety of these things, I have to ask you a question about the tradition of letting the States stand as the first line of authority.

I can't remember where I saw it, but I think it was a little town called Toom, Tenn., with a population of 13. I saw it on some national television program, and those folks had a big problem because they knew there was something wrong with their drinking water. They kept taking it into the State and it kept coming back with the answer there is nothing wrong with it. It turned out, as I recall, the folks at the State were testing for coli bacteria and were not testing for the presence of chemicals.

My question of you or anybody else who can answer it is, in terms of the resources presently available to the States or the resources available to your agency, where practically are we on the issue of EPA coming in here and in effect saying we have big problems in those areas we haven't got regulated; the States are the front line. What is your current judgment about where we should look for answers to these problems, and what are the resources available? Do the States have the financial capacity but they just haven't passed the appropriate kind of regulation?

It seems to me somebody in the Federal Government spent a lot of money sending testing equipment out to the States within the past few years so they could have the capacity to do some of this testing. Are they doing it? What is the state of the States in this area?

Mr. RAVAN. Senator, let me take what I see, and my colleagues, any and all, should feel free to comment as we move toward this question and answer portion of the testimony.

Having had the experience similar to yours, that is, having served as a State director at the executive level of State government, let's say, I have not served in the State legislature; I have worked with legislators.

Senator DURENBERGER. Neither have I, and I had that same experience.

Mr. RAVAN. The same kind of tugging and hauling that we witness here in Washington with regard to balancing of the three sides of the constitutional government—the judicial, the executive, and the congressional—the setting of priorities and then the funding of those priorities, all of that clearly exists in each and every State capital.

Having said that, there exists one fundamental rule for me as I attempt to manage environmental programs, and that is that the intergovernmental function, first of all, is no better or no worse than the persons, such as myself and you and others here today who are participating at that point in time. I have seen the worst and I have seen the best of that because it is that attitude with which you approach the intergovernmental question that tends to dominate the result.

Second, in terms of resources, you have made available to us significant sums of money to assist the programs at the State level. It seems to me at this point in time, 1983, having moved from 1970, let's say, 13 years of environmental improvement in this country, contributions at the Federal, State, and local level for environmental programs, there should exist at the State level a capacity to take up this new call or an increased call for protection of ground water resources at the State level.

I would agree with you that there will be, as there was and continues to be in surface waters, some need for interstate compromises or solutions addressing these problems that might be a very appropriate place for the Federal Government, the EPA in this case, to lend significant assistance.

I also want to say, as we begin to seriously question the need for ground water protection, some of these questions are, frankly, unanswered, and I sit here today unable to answer completely for you the extent of that problem and the threat that it may pose in some situa-

tions, such as the small town, where they don't feel that they have had adequate response from the State resources. They ought to have an adequate, fairly well-defined approach to the Federal resources, and we ought to know under your guidance and counsel how to approach that.

There is a deep, unrelenting, unchanged feeling at the State level that this is their territory. If you push that question very hard, especially in the West, you very quickly get to the question of division of that ground water resource, which can quickly call the question of land-use controls, none of which they want from the Federal Government.

Senator DURENBERGER. Why don't you finish up your statement and maybe we can pick up reactions to that question from other people.

Mr. RAVAN. Let me speak then, Senator, finally to the integration of this EPA program. The EPA can act to protect ground water; the opportunities to coordinate this work is great. A ground water task force was established by Administrator Ruckelshaus in June 1983. The task force was established by Deputy Administrator Alm and is comprised of representatives of all major offices within EPA that have responsibility and the leadership of those programs are right here before you today. Their initial charge has been to identify whatever inconsistencies might exist within the various programs and to develop alternative approaches to resolving the problems.

In addition to the Ground Water Task Force, several other EPA functional groups enhance cross-office coordination of ground-water-related activities. For example, the Science Advisory Board and the Carcinogen Assessment Group both review major health policy issues which may lead to consensus on how to deal with low level chemical risks, including certain ground water contaminants.

Additionally, the Solvents Task Force has been active in assessing the risk to health from a variety of chemicals, most of which have been found in ground water and which are dealt with under several of the Federal regulatory programs.

The Administrator has also set up a task force on use of risk assessment within the Agency. This group is considering ways to improve our consistency in the development and use of risk assessments and, again, we can comment on that further for you here today.

I think I will conclude my remarks by reporting to you, Senator Durenberger, that the Ground Water Task Force result should be a policy that, as Administrator Ruckelshaus has indicated to you already, we should be able to talk about openly, publicly within 30 days, and we will be happy to do that.

We also are in a position to begin staff briefings to your staff and others here in the Congress on what might be considered with regard to a ground water policy for EPA.

Finally, I am happy to report that a decision is imminent from the Administrator and Mr. Alm with regard to the focal point for this ground water protection policy, and it would be within either John Skinner's area or my area, and that decision will be forthcoming. I think that will provide for EPA, perhaps for the first time, a place, a focus, a person on which you and others can call to get directly at this very important crosscutting issue.

Senator DURENBERGER. You are talking about an organizational or management focus within the Agency?

Mr. RAVAN. Yes, at least at the office directorship level which will be directly adjacent or just under the assistant administrator level.

Senator DURENBERGER. Dr. Houk, I understand you have a statement. Please go ahead with your statement.

STATEMENT OF VERNON N. HOUK, DIRECTOR, CENTER FOR ENVIRONMENTAL HEALTH, DEPARTMENT OF HEALTH AND HUMAN SERVICES

Dr. HOUK. Thank you. I am Dr. Vernon Houk, Director, Center for Environmental Health, Centers for Disease Control, and Assistant Administrator of the Agency for Toxic Substances and Disease Registry, of the Public Health Service. I am pleased to be here this afternoon to discuss with you some of the Public Health Service activities related to contamination of ground water with hazardous toxic substances.

The science of epidemiology, one of the basic tools of public health, was firmly established in 1855 when John Snow published his classic paper which showed that cholera was a communicable disease transmitted by water. He did more than that. He stopped an epidemic of cholera in London that year by removing the pump handle from a contaminated well, thus effectively preventing the use of that water.

In the United States, the concern for protection of water supply has had a long history within the Public Health Service. Much of the early efforts in PHS involved work with the States and communities in support of local laws and regulations. As you know, the earliest concern for water purity and safety focused on bacterial contamination. The Public Health Service has continued to be involved with these concerns, expanded over the years to include other infectious and contaminating agents.

The CDC publishes records of outbreaks of acute diseases which have been traced to contaminated water supplies. I would like to enter a copy of our most recent report into the record as a matter of interest.

Senator DURENBERGER. It will be made a part of the record. (See p. 110.)

Dr. HOUK. Contamination of ground water supplies and other water supplies with industrial wastes, particularly chemicals and other hazardous substances, is a more recently recognized phenomenon. In the past 20 years, scientists and the general public expressed concern that considerable potential for harm to the public health can arise if even low levels of some chemicals and other hazardous substances are permitted to enter the drinking water supply.

There are at least two reasons why we have only recently begun to address this problem. First, unlike bacterial or viral contamination, the health effect associated with ingestion of chemicals at very low levels over long periods of time are difficult or impossible to link to a specific exposure. Second, the adverse health effect from drinking water contaminated with small amounts of chemicals may appear 20 to 50 years after exposure. These effects which may include certain cancers, and liver, neurologic or kidney disease have other causes besides chemical exposure. Medical science, at this point, is unable to distinguish among the various causes of these chronic diseases and, there-

fore, is unable to attribute the disease to a specific cause as we are now able to do for most acute toxic, bacterial, or viral illnesses.

As you know, the authority for ground water protection has been vested in EPA since its creation in 1970. However, even with the transfer of this authority, the public health program, particularly CDC, has maintained an active program to evaluate the public health impact from various incidents of contamination of water with chemical and other harmful substances.

I would like to describe briefly some of our efforts both before and after the enactment of Superfund. In 1979, a suspected carcinogen in humans—trichloroethylene—was found to be a widespread contaminant in drinking water supplies in Montgomery and Bucks counties in Pennsylvania. We did a study that showed 6 percent of 117 residents had detectable levels of TCE metabolites in their urine. This indicated that exposure had been recent. We did not find any acute disease associated in the public. However, in the workers at the manufacturing plant thought to be responsible found significant occupational incidents of exposure to this compound.

In another study, chemical contamination of a water supply, we examined persons in Alaska who drank water from wells contaminated with arsenic. Again, we did not find any acute health effect such as nerve conduction defects or sensory neuropathy, but we did find increased exposure to arsenic in this community.

These two studies point out the difficulty we are confronted with when we attempt to identify acute or measurable immediate health effect from exposures to chemicals in water, even when these exposures are well above the permissible levels.

The delegation of authority for the public health and worker health safety provisions of Superfund to HHS by the President in August 1980 and the establishment of the Agency for toxic substances and disease registry within the Public Health Service have focused our activities in evaluating the possible short-term acute and long-term chronic health effect of exposures to hazardous materials in contaminated ground water. I would like to give you several examples of immediate response which we have taken under Superfund authority to some typical situations involving ground water contamination. In these cases, we attempted to identify any immediately recognizable health effect and make recommendations to minimize further exposures.

In Perdido, Ala., the ground water was contaminated by benzene we found no measurable adverse health effects at that time, but took action to recommend additional sources of water brought into that community.

At the Tucson International Airport, Tucson, Ariz., the aquifer was contaminated with chromium and trichloroethylene. We found no acute health effect. We have made recommendations that the wells be monitored and any well showing PCE above five parts per billion be abandoned and not used.

The EPA criteria for the maximum protection of human health from the potential carcinogenic effect of TCE in ambient water is zero. This zero level, however, may not be obtainable and is of great concern to us because that is the only source of water in that area of Arizona.

In Verona Well Field, Battle Creek, Mich., several solvents contaminated the water. We found no acute health effect. However, bottled

water and public shower facilities were provided and now additional sources of noncontaminated water is being brought into that area.

In Libby, Mont., pentachlorophenol, a wood preserving chemical was found in the ground water. Again, we recommended water from ground wells not be used for human consumption.

In the area of gasoline spills, I would point out that not only is the contamination of water supplies, but at least in one instance in a very large spill in Idaho, the contamination is such that the amount of volatiles in the basements of some of the homes and in the shafts of some of the elevators are at a level where they could explode, 10,000 parts per million—whereas one detects the smell at 700 parts per million of gasoline.

Senator DURENBERGER. Can you tell us a little bit how that comes about?

Dr. HOUK. There is a large tank farm in that area with pipelines coming in.

Senator DURENBERGER. Where are we talking about?

Dr. HOUK. Around Boise, Idaho. It is estimated that some 90 million gallons of gasoline or petroleum products have been lost over the 30 years and about 400,000 last year. The structure of the community is such, or the geologic structure is such that there is a ground cover about 5 or 6 feet below the surface that is impermeable and so the houses built on slab have no problems. If there is a basement or a public building that has an elevator shaft which protrudes into the ground water contamination zone it could cause very significant amounts of leaking of gasoline into the building.

The other thing about the gasoline storage is the addition of lead and the various kinds of chemicals you have, particularly ethylene dibromide of which I think about 300,000 pounds are produced a year. 80 percent of that is used as a lead scavenger in the production of leaded gasoline.

And so the regulation to reduce the amount of lead in gasoline promulgated by EPA, which is doing very well, in addition to the lead, may have something to do with removing some of the ethylene dibromide.

Senator DURENBERGER. Do you want to tell us how well the State of Idaho is doing with that tank farm?

Dr. HOUK. Idaho is doing very well, handling it as best they can, working with the Environmental Protection Agency, trying to design some engineering devices to recover the petroleum products. Already to date, and with the gasoline companies, to date something like 135,000 gallons of petroleum have been recovered from the ground water.

Senator DURENBERGER. What happened to the tank farm?

Dr. HOUK. It is still there.

Senator DURENBERGER. Still leaking?

Dr. HOUK. We estimated it loses about 1 percent per year.

Senator DURENBERGER. What are we doing about that? What is anybody doing about that?

Dr. HOUK. The Department of Transportation has recently become involved in that.

Senator DURENBERGER. What are they going to do?

Dr. Houk. It is their regulatory responsibility to make sure that it does not leak.

Senator DURENBERGER. What authority do they have to stop the leak?

Dr. Houk. I don't know. They have the regulatory authority because it is transportation of petroleum. I don't know the specific citations, sir. I can find them.

Senator DURENBERGER. Why don't you give them some information on it. I assume my tax dollars some way or another are going out to Idaho to clean this thing up, and it is cleaning up something that happened yesterday while today 1 percent of 90 million gallons, whatever you said, is still leaking.

Dr. Houk. It is estimated, the last estimate I saw is about 400,000 gallons in the last year had been lost in the system.

Senator DURENBERGER. Do you know anything about Long Prairie, Minn.?

Dr. Houk. Yes.

Senator DURENBERGER. CDC has been up there?

Dr. Houk. Yes.

Senator DURENBERGER. Tell me a little bit about that.

Dr. Houk. Again, we have not found significant health effects, but we are involved with the State health department trying to design studies to see if there are any.

Senator DURENBERGER. What was the cause/effect relationship?

Dr. Houk. I don't know the particulars of that, Senator.

An incident on the Mississippi River typifies the Department of Health and Human Services' Superfund emergency response actions. A barge in tow carrying 420,000 gallons of benzene broke loose and sank, releasing some of the benzene into the river. Within 1 hour of notification, we were providing the Federal on-scene coordinator consultation on worker safety, potential food chain involvement and assistance in developing evacuation plans. Our personnel and others were placed on standby. The district Food and Drug Administration investigative team and laboratory were put on alert. River traffic was halted and the downstream water intakes were closed to minimize potential exposure until we found out exactly how much benzene was leaking, and, fortunately, it was not a great amount.

In each of the above instances, our response was to address the issue of acute and immediate health effects either from exposure, or potential exposure to these hazardous substances. The question remains, what long-term health effects, if any, are there to persons exposed in these and in other situations? One of the most commonly recommended tools for studying the chronic and long-term effects of exposure is to construct a registry of persons exposed. The persons in the registry can then be tested periodically to determine their health status and eventually determine the cause of their death.

The use of registries to evaluate the long-term human health effects of toxic chemical exposures began prior to the passage of Superfund. For example, in 1975, in cooperation with the State of Michigan, we set up a registry of 4,000 persons exposed to polybrominated biphenyls after occurrence of an accidental mixture of that chemical into feed grains which were then fed to cattle. Also, the CDC's National Institute for Occupational Safety and Health has been studying the health effects of chemical exposures among workers through the establishment of these registries.

Registries cannot be used to give quick, conclusive answers to the many questions that people ask about the effects of toxic chemical exposure on their health or the health of their children. Even the most active and aggressively pursued studies using registries require decades to produce meaningful results. And in addition to that, sir, they are extremely expensive. It is also true that whenever the results of these long-term studies are made available, the findings are likely to be hotly debated by scientists who honestly represent different points of view.

I point out these inherent limitations in registries to call to your attention the fact that expectations for registries being used as a tool to set public policy in the near future may be unrealistically high.

Even with these limitations, however, we are committed to the use of registries where appropriate to attempt to clarify the link between toxic exposures and adverse health outcomes. Among the questions that need to be answered are: (1) What measures of exposure should be used to set guidelines for eligibility for inclusion in a registry? (2) To what extent are people willing to participate over the course of a lifetime in active followup registries—a constant, stressful reminder of the fact that they were exposed to a toxic substance? (3) How can we assure that a commitment made today to establish and maintain a registry will be carried through over a period of 10, 20, 30, or even 40 years? (4) What level of followup is necessary scientifically to provide estimates of risk which then can be used to make sound decisions to manage that risk?

In carrying out responsibilities under Superfund, we will cooperate with States and with other Federal and local officials to establish and maintain registries of persons exposed to toxic substances as a result of an environmental exposure, whenever their inclusion in such registries would be scientifically appropriate or valuable for long-term followup or specific scientific studies. We are committed to defining the particular circumstances for such registries to be reviewed by scientists and others both within and outside the Government.

In the meantime, both CDC and the Agency for Toxic Substances and Disease Registry will continue to respond to specific incidents of human exposure to toxic or hazardous substances in ground water and through other routes. We will continue our efforts to measure both the immediate and the long-term health effects and to make sound recommendations to EPA for the attenuation of these risks.

And most importantly, although the results of our studies may not provide conclusive answers about health risks, which are so necessary, we hope that we can demonstrate strong associations where they exist between exposure and adverse health outcomes so that reasonable people can take reasonable action to protect the public health and the environment.

That concludes my testimony. I will be pleased to answer any questions.

Senator DURENBERGER. Thank you. I particularly appreciate that last line about reasonable people taking reasonable action.

I know the problem is difficult, as you have indicated in your statement, nobody has proof in hand and in a lot of cases it takes time. Unless we make some investments somewhere along the line, we are not going to get the right kind of answers to all of these problems.

Dr. HOUK. May I make a comment, Senator?

Senator DURENBERGER. Yes.

Dr. HOUK. We may never have conclusive answers on the human health effects in these areas. People frequently give you a liturgy, and very well recited, on the animal toxicological data on the toxic effects. They then say, but that has not been shown to be true in people, an accurate statement, but a very misleading statement. The truth of the matter is that studies in humans have not been done, and it may not be possible to do them to show an effect or lack of effect. We then have to rely upon the best evidence that we have, using the animal studies, and that is the best we have, and public policy people then have to make some very tough decisions on handling these chemicals in the absence of absolute, conclusive human data which may never be forthcoming.

Senator DURENBERGER. I appreciate that comment because it is realistic about where we are today.

I am not talking about anyone's ability, in the short term, to come up with all of the answers for the people in Long Prairie, Brighton, Boise or anyplace else. It is a question of whether or not as a nation we are putting the best effort forward to finding those appropriate answers that at least take the concerns and, in some cases, the fears out of the process.

I guess when I react that way, it is a reaction to minimizing best effort to a very, very difficult problem. Just because we can't come up with the answers that are difficult to come up with does not mean, as a society, we should not be putting that effort forward.

By way of a starter, I would like each of you to assess, from your view, the extent of ground water contamination in the United States as you see it from your personal programmatic perspective. What do we know about it; how extensive is it; how large do you see the problem? Dr. Moore, do you want to be the first?

Dr. MOORE. Senator, speaking with respect to pesticides and toxic substances—some of the specific questions you might get into later in this hearing—certainly there are instances where some of the pesticides that have been registered for use have found their way into ground water in a number of instances, and they are a minority of instances, but the mere fact of their presence of chemicals which by their nature have inherent toxicity is some cause for concern. Indeed, it needs to be dealt with with a lot of efforts to look at how, despite best judgments at the time, we found the judgments were poor and, indeed, takes measures to correct those.

With regard to toxics outside the pesticides, I think it basically is an unknown with the exception, again, of some of the things Jack Ravan mentioned in his opening testimony—petroleum, underground storage tanks. It is a factor, and data is available through several State institutions. The American Petroleum Institute in this regard also underscores that type of effect.

Similarly, underground storage of a number of chemicals that are used in industry, stored underground because they are solvents and they are volatile to the degree they need to be confined to these areas. Trichloroethylene is an example. I think it is based on an unknown.

Senator DURENBERGER. In your area of responsibility, starting with pesticides, it is an impossibility to punch up a computer and know of

a problem. The truth, I take it, is you don't know there is a problem, or even a potential problem, until it is brought to your attention in a specific instance in a specific area.

Dr. MOORE. To say that, for a given pesticide, we have not found it in any ground water is, I think, a misleading statement because nobody has tested the ground water specifically for it.

The estimates are that with the several hundred active ingredients found in various pesticide products today, there are probably 50 that might potentially find their way to ground water. That is not to infer all 50 are in ground water. Today's technology suggests it is about 8 percent that might have a potential for making its way to ground water.

Senator DURENBERGER. Dr. Goldstein, I want to welcome you specifically. There is a particular interest in the adequacy or inadequacies for which we are financing research and development in this area. I am very, very pleased to have you on board.

Dr. GOLDSTEIN. Thank you, Senator. I appreciate your remarks. In terms of how extensive it is, I think Jack has given you the best answer. Really we don't know how extensive it is. It is something we must find out. I have a briefing book prepared for me with all sorts of numbers. You probably know the numbers better than I do. They clearly are not an evaluation of the total subset of possible instances. It certainly is extensive enough to warrant our doing something about it and certainly extensive enough to warrant our evaluating further what the implications are.

I would agree with what Dr. Houk said with the way the data must be assessed in terms of the potential of this being an adverse effect. Therefore, we have to find out more about it. It is a very straightforward kind of answer from a research and development point of view.

Senator DURENBERGER. Dr. Skinner.

Dr. SKINNER. In the hazardous waste area, solid waste area, I would say ground water contamination from hazardous waste sites is—if not the major environmental problem—is a major environmental problem. We have done monitoring around sites over the years, and we found ground water contamination in many, many instances. Many of the sites that are on the national priority list have potential for or have demonstrated contamination of ground water.

Senator DURENBERGER. Dr. Houk.

Dr. HOUK. We don't know how extensive it is, but I would like to give another example. In cooperation with the States and local health departments, in the local communities, we have provided this country—we collectively as a society—have provided this country with bacteriologically acceptable safe water. That was relatively easy. There were engineering things to be done. We had disease outbreaks when it was grossly contaminated so we could know when it was contaminated. We had an easy testing device of bacteriological samplings of the water, et cetera.

The issues are more complex when you are dealing with chemicals, but we ought to address those complex issues and design a system so that we again can ensure, as a society, the population of this country of acceptable drinking water. I think if we have the technology, I think we have the ability; I think we have the skills, and I think we have the

ingenuity to do so if we simply address the issue and not cloud the issue with a lot of things such as saying we don't know what it is, it's too expensive, et cetera. We should find out what the problem is. Let's measure some of these contaminants. Let's take those of highest priority that we should be concerned about and measure those adequately and see where we stand and then move on.

We have faced the issue of water contamination though with a different agent, and we have basically solved that issue in this country.

Senator DURENBERGER. Jack, you may want to comment on this, but let me start with a second question of everyone which is to ask you to give us a breakdown of your program office budgets with respect to ground water protection.

Mr. RAVAN. Senator, I wanted to itemize three for you. Obviously, the Office of Water contributes in some form or another—in other words, it would be hard to say that any one particular person of the persons in the Office of Water does not contribute anything to this program of ground water protection, either past, present, or future. The difficulty of handling the question, however, to be specific for you since the budgetary process has not, prior to this time, tracked resources committed to ground water protection.

Let me identify three for you that I think are contributory. We have the underground injection control program. It does address ground water fairly exclusively. In fiscal year 1984, we budgeted \$4.1 million for program management and \$7.5 million for grants to States in that one program alone, something like \$12 million.

Senator DURENBERGER. Do you know how that compares with 1983?

Mr. RAVAN. I would say some increase, Senator, probably on the order and magnitude of not more than 10 percent; not up dramatically by comparison to 1983. That is about correct, 10 percent. I will get a specific for you.

A major portion of the current drinking water standards development effort addresses contaminants found in ground water. The budget in this area for fiscal year 1984 is \$8.3 million. Then in the public water supply system program, which is grants from EPA to the States, fiscal year 1984 budget figures for this program are \$5.1 million for program management and \$27.5 million for grants to the States. That does not say, Senator, all that money would be devoted to ground water. It simply gives them an opportunity to use it if they care to do so.

Those are the three items I would point to specifically, and I have numbers available that would stress how much of our resources are going toward this problem.

I would also indicate, again, that it is clear to me 18 days into the agency that the ground water budget is going to increase.

Senator DURENBERGER. Dr. Moore.

Dr. MOORE. My program doesn't have anything by line item as opposed to ground water. It is more pervasive than some of the review and registration. There are some specifics related to pesticides, specifically ground water efforts in the State of Florida. That was an add-on appropriation. I think Dr. Goldstein is prepared to comment about that.

Senator DURENBERGER. Do you have anything in your area you can tell us about in 1984?

Dr. MOORE. Not as a line item.

Senator DURENBERGER. Any increases to help out the Florida problem?

Dr. MOORE. Not as a line item.

Senator DURENBERGER. Dr. Goldstein.

Dr. GOLDSTEIN. We have part of our budget identified in ground water after a specific initiative in this area, sort of matrix management approach was done in the past year to attempt to come to grips with the problem of ground water. It partially did so and identified a specific part of the budget, \$9.3 million, in fact, under certain headings of research we do.

The health budget is not specifically indicated as ground water. There is an additional perhaps \$800,000 we can point to in the health budget and say this is health-related research for drinking water substances which are particularly ground water problems. We have not specifically made a separate heading for the health.

We have numbers for the preceding year which were \$8.1 million, and before that, \$7.6 million. So there has been a steady increase in the amount of funds that we are identifying. Again, primarily in the ecological processes and effects area in the monitoring area, some of this, of course, is related to Superfund projects and Superfund sites.

There is also some research being done in the control technology area which has to do with removal of compounds in drinking water which also perhaps we could call it ground water-related research, but it isn't specifically identified in our budget as such.

Senator DURENBERGER. Dr. Skinner.

Dr. SKINNER. Again, these are estimates because we don't budget specifically for ground water work. In the hazardous waste area, including hazardous waste research, abatement and control and enforcement estimate about \$130 million in the 1984 operating plan.

In the Superfund area, including research enforcement response actions and management of the fund, about \$400 million in the 1984 operating plan.

Senator DURENBERGER. How does that compare to 1983?

Dr. SKINNER. It is an increase. I don't have the 1983 numbers with me.

Senator DURENBERGER. Dr. Houk, what is going on at CDC?

Dr. HOUK. We have nothing specifically set aside for ground water. We do our emergency responses. I point out, dollars are not the only resource that is necessary. The kinds of health studies we do are very labor intensive and people intensive. Unless you have people knowledgeable in this area who can carry out the kind of studies, all the money in the world is not going to make a particularly good study come out.

I mentioned specifically, Senator, the registry. I think there are a lot of expectations of what these can do. The most passive followup of a registry is simply a line listing of people that you match against the national death index by computer once a year. The next level above that is what we have with the PCB registry going on in Michigan which actually keeps track of those people. We are not doing any specific studies on them. Four thousand people, and the cost of that registry is \$400,000 per year, \$100 per person per year at that level of

activity. And we have found since establishing that in 1975 that it is becoming more and more difficult each year to get the participating agencies at EPA, several Public Health Service agencies and ourself, to get each agency's share to go into that, one of the reasons we feel very strongly the registry should be used only when there is some scientific reason for using it and we can get some commitment of resources for the long term before those are established.

Senator DURENBERGER. Jack, what has happened in this ground water area over the last 4 years? I know Doug Costle had to leave because Jimmy Carter had to leave, but there seemed to be a strong commitment in 1980 by the Carter administration, and particularly by Doug Costle, and now we are 30 days from the renewal of that commitment. Can you give us a little bit of education about what went on in that interim period of time and why it went on?

Mr. RAVAN. Senator, to the best of my knowledge, I will and I will attempt to stick to what hopefully is supportable in the public record in giving credit where credit is due. I think you are correct. Administrator Costle apparently did, in fact, appear on the scene as the first administrator to identify that there might be a need for a separation or an identity for a protection policy strategy, et cetera, for ground waters as opposed to oceans, as opposed to surface waters. It kicked off an effort inside the agency which, honestly, I am not too well up to date on except the fact it did happen.

Certain of the professional staff did get together and begin to assemble a response to Mr. Costle's question, Is there a need? What is it? How do we define it?

Mr. Costle did depart and the Agency went through about, as I recall, 6 months of there not being a full-fledged, confirmed by the Senate Administrator. Mrs. Burford subsequently in about June 1981 was confirmed by the Senate and took charge of the area, and renewed this effort.

Such effort was, first of all, about 2 years in the making. It was, in fact, a continuation of the recognition that ground water was an area of concern and two points, I think, need to be identified.

First of all, a new administrative head of the Agency became involved and convinced that there was a need and, second, there were new procedures in town, a Cabinet Council for Natural Resources, I believe is the nomenclature, whereby major efforts of this nature were discussed and had to be discussed and needed to be discussed. And the ground water strategy/policy phase II, let's call it, was introduced into that Council and went through a very thorough discussion by other departments, agencies other than EPA looking for the opportunities for coordination or overlap and so forth.

That particular effort, of course, goes away with two facts, I think. One was the Council did not approve that particular draft or version because, as I made earlier reference in my remarks, I believe there was an exception by the Council that there was somehow an obsession on land use control or perhaps water rights in the West. Whether or not that is true, whether or not it was even germane to the issue at that time, I really cannot comment.

Senator DURENBERGER. This is the Council headed by the famous foundation executive, is that it?

Mr. RAVAN. I believe a lot of these players are not on the scene today, which I believe we can all accept as life in Washington, D.C., or the lack of life in Washington, D.C., it is important because at the helm of the agency now is Administrator Ruckelshaus.

I think two points are important here. No. 1, Mr. Ruckelshaus comes to the Agency steeped in experience with regard to the management of environmental issues, both as EPA Administrator and as a citizen in the Department of Justice, so forth.

Second, he has assembled around him a very competent team. I am not polishing anybody's apple, these are simply facts I think the record will bear me out. The Deputy Administrator, Mr. Alm, and myself, having nothing to do with the political process, all come to the Agency pretty much convinced that there is a need to recognize ground water as a body of water not necessarily addressed in the past and needing addressing now. It is threatened. We know that, and we have got to do something about it.

So that last 6 months of this 4-year period, I think, has seen some fairly exciting results and I believe—I am convinced and I am here today to support that—that within 30 days, you will see the grandson or the version, whichever, of the ground water strategy that purports to get at this problem.

Senator DURENBERGER. Is the process that the agency is going through strictly inside the agency proposal or have outsiders been involved?

Mr. RAVAN. So far it has been internal to EPA; yes, sir.

Senator DURENBERGER. Has it gone through the Cabinet Council yet?

Mr. RAVAN. No, sir.

Senator DURENBERGER. Will that come after the 30 days are over?

Mr. RAVAN. Clearly they will be made aware of this.

Senator DURENBERGER. Does that suggest a change in the process? Well, maybe we will find out those answers.

Let me start through a list of specific questions. I am going to start with you, Jack, and these will be very basic, but in effect they are for the record. If we are taking a clear, sharp focus, committed look at this problem starting some time early 1984, one of the reasons for this hearing, besides the education, is to make a record of where we are at and where we have been, at least from this subcommittee's standpoint, so we have some idea of what our strengths and weaknesses have been.

I am going to start with TCE, which I promised not to try to pronounce earlier on. Why don't I start with you and ask you to tell us what it is, trichloroethylene.

Mr. RAVAN. Senator, trichloroethylene—TCE I would like to call it also. I am going to, as you already indicated, call on better experts than myself in this field. First of all, it is a solvent. Seventy percent of its use is, in fact, for metal degreasing. It also has other uses. All of us can go out and buy it as a product from the shelf if we know what store to go to. It is found in adhesives. It is used for paint stripping. It is a carrier of other solvents and also used in the textile industry.

One thing that we know is that there is a lot of it in the United States and at the same time, it does seem to be decreasing at least in production because of the attraction for regulatory processes.

Senator DURENBERGER. Let me ask you, Dr. Houk, whether it causes disease.

Dr. Houk. Yes, it certainly, in high concentrations and acute exposure, causes disease. In the animal models it is carcinogenic. I believe teratogenic causes a lot of other things at low doses. Again, we don't know how to measure the specific disease, the more common disease caused by these chemicals.

I believe that we will find very few examples of specific disease, specific substance. Mesothelioma, asbestos, angiosarcoma, polyvinyl chloride. I think those will be few in number.

The majority of the risks are simply increasing the risks of more common diseases. Then how do you ferret out those? We may never know. We may have to have large populations. If it is a rare tumor that is caused by something—let me give an example that is batted around all the time.

That is soft tissue sarcoma and 2,3,7,8-dioxin. There are oodles of studies that said dioxin does not cause soft tissue sarcomas. Most of the studies are workers; have examined 100, 150, and even in a study of 1,700, we would expect to find 0.07, seven one-hundredths of a death. You can't find seven one-hundredths of a death. You either find one or don't find one. If you don't find one, it doesn't make it negative, and if you do find one, it doesn't make it positive. If you find two, you will be concerned. If you find three, you are more concerned, and if you find four, you are a lot more concerned.

I think the point has to be made over and over and over, we are never going to have all of the final information on these compounds and what they do to humans. We are going to have to take action. I don't believe it is fair to say that we cannot take action because we don't have all of the information we need. I point out on the issue of lead, I point out on the issue of polyvinyl chloride, I point out on the issue of asbestos. I can point out on several issues, we have all the information we need to take action and we have not taken effective action.

Senator DURENBERGER. Jack, what do we know about TCE in ground water?

Mr. RAVAN. Senator, we know it is there. We are finding it in various cases. The four specifically, one in your State where eight wells apparently were contaminated by this compound and remedial action had to be taken on at least 50 percent of these wells.

There are other cases of TCE being found around the country—Tucson, Long Island, and I believe in Florida.

Senator DURENBERGER. Can you quantify the amount of information available to EPA now on TCE contamination in any way? Is there a lot of information? Is it all relatively new? Has it been around for a while? What is the situation at EPA regarding our knowledge of the problem?

Mr. RAVAN. It is fairly new information. Senator, compared to bodies of data that are available to the agency to operate on. In the case of TCE, again, it is most likely to be identified because of some specific case being brought to our attention, not necessarily because we are out looking for TCE.

Senator DURENBERGER. EPA is charged with issuing MCL to the maximum contaminant level to water pollutants. Have they issued one on TCE and, if they haven't, why not?

Mr. RAVAN. I believe there is an MCL in the process for TCE, Senator. Let me check my staff for that.

Senator DURENBERGER. Certainly.

Mr. RAVAN. That is correct, there is an advisory out for TCE.

Senator DURENBERGER. What does that mean?

Mr. RAVAN. It simply means we are saying to a public that has an interest in knowing, typically drinking water suppliers, that if there is a maximum contaminant level above which we recommend that action be taken. If you are above that level and you are finding TCE, then you ought to do something about it. That advisory does exist and that particular compound, TCE, is in phase I of the four phases we identified to you earlier.

Senator DURENBERGER. You haven't even gotten to the regulatory part of it yet?

Mr. RAVAN. No.

Senator DURENBERGER. You just have the door open.

Mr. RAVAN. That is right.

Senator DURENBERGER. Let me go back to you, Dr. Houk. HHS is required under section 104(i) of the Superfund law to conduct research on toxic chemicals and to establish a registry, which you talked about, of persons exposed to toxics. Are there studies being conducted, and are there any disease registries established under that particular provision?

Dr. HOUK. As I mentioned, the PBB registry was started before Superfund. We are attempting to start a registry of dioxin exposure, a registry of PCB, polychlorinated biphenyls exposure. We would hope with the Bucks County, Pa., experience and maybe with Tucson to establish some information, some long-term studies. We have looked at the cancer rates in these various places; have not found them increased.

One of the difficulties is that diseases generally tend to be recorded by the geopolitical boundary, that is, counties. And we have to restructure the entire reporting system as relates to the environmental causes of diseases into environmental boundaries.

As an example, in one aquifer contamination in the State of Florida, no one is at risk of that contamination until it is five counties away from where the contamination occurred. So if you look in that one county, you wouldn't find anything and you would have to look elsewhere. There are many examples of that around this country.

I would think in relation to—if we are going to use the risk assessments, and TCE is a perfectly good example, there is no threshold level that can be determined so that means the level for TCE should be zero, but if you have a town that has only one source of water, that is, Tucson, and no potential of bringing another source of water in, or that potential, I think, is fairly remote, and it is impossible with engineering to achieve a zero level or nondetectable level into the low parts per trillion or parts per quadrillion, then some assessment by EPA and others has to be made of what is possible to engineer and what is the risk of drinking that particular water.

These answers are not easy. They are answers to very difficult questions and have to be grappled with. Simply because they are difficult does not mean we should not grapple with them, and certainly neither the Environmental Protection Agency nor the HHS, have abrogated that responsibility, and grapple with these issues daily.

We have a very close relationship with all of the sections of EPA. Senator DURENBERGER. Jack, do you want to add a dimension to that?

Mr. RAVAN. Joe Cotruvo is bringing to my attention it might be worth getting on to the record that TCE in water, ground water, drinking water, is just one way the body can uptake or intake TCE. It does exist in certain working environments and other by-chance incidental environments that a person in the United States might come in contact with. Therefore, we are not certain that the uptake or intake is simply because of drinking water.

Another reason we want to keep track of it is that it is an indicator that other similar compounds may very well be there.

Senator DURENBERGER. Under TSCA, the EPA can compel manufacturers of chemicals to produce data and conduct health studies. Has the Office of Drinking Water ever solicited the Office of Toxic Substances in this area?

Mr. RAVAN. During my tenure, Senator, that particular question has not come up. What has occurred is that Jack Moore and I have already gotten together because we have seen the need for close cooperation and have set a policy, a tone, or whatever description it might take, that clearly indicates to our staff that such cooperation between the two offices is not just a nice thing to do. It is mandatory as far as we are concerned. As long as we are there, that is going to be the case.

Senator DURENBERGER. Let me go to Dr. Moore, then, and ask him if the Office of Toxic Substances does have information on TCE, such as manufacturers' identify, production volume—that sort of thing.

Dr. MOORE. It has to be in TSCA inventory so we have to have some of the types of data that you identified. The national toxicology program has had underway for several years a number of tests dealing with various toxicity potential of trichloroethylene, and I would presume OPTS and elsewhere in the Agency have been reluctant to press for further, additional tests until they find out the result of those tests and quality of those tests. They are currently in the late phase of review and are in the process of being audited.

I think based on the quality of that data would determine as to whether or not additional data would be needed.

Senator DURENBERGER. Could we move this phase of questioning to you, Dr. Goldstein, and have you comment on the national toxicology program and the study being conducted there?

Dr. GOLDSTEIN. I really can't comment further than Dr. Moore on that specific study. In ORD, we are supporting a genotoxicity study, looking at whether or not trichloroethylene has an effect on chromosomes. So there is ongoing research in that area in our health effects program.

Most of our activity has been, however, in health effects assessments. We have done risk assessments on this compound since 1979. Interestingly enough, looking through this, the first one was on trichloroethylene in the air.

Senator DURENBERGER. Who else might be doing TCE studies and the toxicology aspect of it? The National Institute of Environmental Health Sciences, FDA?

Dr. GOLDSTEIN. I think we would have to check to see whether there is a direct support in the National Institute of Environmental Health

Sciences. Trichloroethylene is being studied by a number of different people who are looking at testing approaches, genotoxicity tests, where it is one of many different compounds under study to validate these tests.

I am sure if I looked around I could find people who have used the compound. I can't think offhand, except for the ones we mentioned that are specifically directed toward trichloroethylene. There are some studies looking at trichloroethylene metabolism trying to find out about trichloroethylene and how it does produce adverse effects.

Senator DURENBERGER. Has TCE been detected at any number of waste disposal sites?

Dr. SKINNER. TCE is a hazardous waste under RCRA and is regulated as such, along with a series of similar solvents. So it would be subject to RCRA regulations.

In the Superfund area, in the 546 national priority list sites, it has been identified as a contaminant in the ground water at approximately 180 of those sites.

Senator DURENBERGER. Do you know whether or not TCE can damage the disposal sites? Has it got that capability?

Dr. SKINNER. We are doing an evaluation of TCE as a candidate for prohibiting or restricting disposal on the land. One of the considerations is penetration of the liner or damage to the liner on the site.

Senator DURENBERGER. As of now, though, no action has been taken to prevent disposal of TCE or to regulate it at the sites?

Dr. SKINNER. It is regulated in accordance with the standards of RCRA, but its disposal is not prohibited.

Senator DURENBERGER. Let me go to aldicarb and ethylene dibromide, and start with Dr. Moore, I have been told that aldicarb is the most acutely toxic pesticide registered for general use in the United States. I don't know who told me that. You might tell me whether that is, in fact, true or not, but my main question is to start by describing it for us so we might have a record on aldicarb.

Dr. MOORE. Senator, whether it was the most toxic—it is awfully close, if it isn't. As far as acute toxicity is concerned, the effects of aldicarb are acute. With the enzyme called cholinesterase, one ends up with neurologic upsets, and if you get a high enough dose it could end up with death.

There has been an extensive amount of work—toxicological data—on aldicarb which suggests the toxicity is an acute toxicity and, indeed, there is no chronic toxicity in exposure to a maximum. Although it is the most acutely toxic chemical that may be registered as a pesticide, its effects are associated with acute episodes and chronic sequelae such as found to be a carcinogen in animal studies.

Senator DURENBERGER. I take it it is in general use in most parts of the country; is that correct?

Dr. MOORE. It has had wide use across the country; yes.

Senator DURENBERGER. Still has wide use?

Dr. MOORE. Still has wide use across the country.

Senator DURENBERGER. And it is used for what specific purpose as a pesticide?

Dr. MOORE. It has a variety of uses, a variety of products. The problems that have led to the public awareness of aldicarb, one of these chemicals can find its way to ground water, indeed, has found its way to ground water particularly in its use in soils, sandy soils that have very little organic matter in those soils, such as the Long Island, N.Y., area or some areas of Florida. It has also been found in areas of Wisconsin, Maine, California, Arizona, Missouri, Virginia, to mention some. It has been restricted in use in some of these areas.

Senator DURENBERGER. Dr. Houk, do you want to tell us, from your perspective, the adverse health effects from aldicarb?

Dr. HOUK. Aldicarb is a toxic compound. I was looking for a specific quote, and if I may, I will cite it for the record because it is what I was talking about earlier that because health effects have not been done, a representative of the company who manufactures aldicarb says that there are no health effects and that the acute effects are easily reversible in people. I think that is a misstatement. I will find that quote, Senator, and make sure that I insert it for you.

Senator DURENBERGER. All right. Do you know of any studies on long-term, low-level health effects that have been conducted?

Dr. HOUK. The ones that are generally available are in the occupational setting and usually would have higher exposure than one would expect in the non-occupation environment. There are studies on workers. I cannot cite them off the top of my head. I can submit a list of them.

Senator DURENBERGER. Just so I understand you, most of the information we do have available is from the manufacturer; is that correct?

Dr. HOUK. In the occupational setting, most from the applicators, et cetera, are health effect studies. Again, the numbers are small and the studies are not adequate when they are negative to demonstrate that there is no concern on this compound.

Dr. MOORE. I can expand upon that. I think you are correct, if your statement was inferring majority of toxicity data that is available through laboratory testing has, indeed, been generated, or funded by the company that manufactures it. There have been a few studies outside of that dealing with human health effects, particularly the concern of some people of infertility problems in women, primarily in the Long Island area. Both of those studies have commissioned, had the direct involvement of EPA. In one instance, the study was found to be negative. They couldn't find any association between the aldicarb consumption and the effects on the female. The other study had a number of serious flaws in it. It could best be said that one can't draw a conclusion.

Senator DURENBERGER. How much of the manufacturer furnished toxicity information was furnished with its registration application?

Dr. MOORE. I can't answer that. I don't know how much was submitted as the original registration application versus what is in the file today. I could provide that for you. (See p. 145.)

Senator DURENBERGER. I would appreciate it if you would. Also, in answer to the next question, which is whether or not that information was requested by EPA, if so, why and if not, why not.

Another chemical in this area is ethylene dibromide. Would you describe for us briefly what EDB is and what its, if any, adverse health effects might be?

Dr. MOORE. Ethylene dibromide has a fair amount of animal toxicity data suggesting adverse effects as opposed to what we just discussed with aldicarb. It has been found to be mutagenic. It does affect chromosomes. It has been found to be positive in animal cancer studies in all sexes of all species that have been looked at, typically maximized, male and female. It also has reproductive effects associated with the animals.

Senator DURENBERGER. Do you want to take us into the ground water now?

Dr. MOORE. Ethylene dibromide has found its way to ground water, again, particularly in the soil types I described previously, the sandy soils. The nature of the use of ethylene dibromide, one of the major uses has been for the treatment of nematodes. So it was a direct injection into the soil in fairly high concentrations. It has probably enhanced its ability to find its way to ground water in those circumstances.

As I think you are aware, Senator, that use was suspended under the emergency suspension provisions of FIFRA by the Administrator in late September.

Senator DURENBERGER. Now tell me with all that experience in hand, is EPA now routinely requiring information on the ability of pesticides to contaminate ground water whenever it reviews registration applications?

Dr. MOORE. Yes; it has a number of data sets it would like to have available. Also, in those instances where it finds a chemical that might have a potential for making its way into ground water, they are now actively asking the producer of that chemical to monitor to find out whether or not it does make it or doesn't make it into ground water.

Senator DURENBERGER. Do you have any ready, at hand examples?

Dr. MOORE. Again, with aldicarb—I think I have an example. I am not sure I can find it.

Senator DURENBERGER. While you are looking for that, let me ask Dr. Houk, we have just been talking about three chemicals which are known to contaminate drinking water supplies in the United States and my question is whether or not the Department of Health and Human Services maintains any kind of central list of all the contaminated supplies. We have been talking about the registry with people involved, but is there maintained a central list of contaminated supplies?

Dr. HOUK. As part of CERCLA legislation—we haven't yet, we are in the process of finalizing a contract with the National Governors Association to develop a list of hazardous waste sites that are closed to the public or closed to fishing. Whether or not we will be able to develop a list of contaminated water supplies or not, I don't know yet. We haven't taken that. If they are contaminated above the levels EPA would permit, they would not be permitted to be used for human consumption.

The matter of, I think, potential information of ground water and the drinking water becomes of great concern to me, Senator, as a public health official because people who have to drink the water have no other alternative and that becomes a risk of which they have no choice of whether they can take or not take, like driving your car with seat belts, smoking, over eating, et cetera. We hope, and if it becomes

necessary, we will consider with EPA and I think they would have the information on the public water supplies of what is acceptable and not acceptable at least with the criteria they have established under their various authority.

Senator DURENBERGER. Would you at that point for the record tell us whether or not you are establishing registries of persons drinking water that is contaminated with aldicarb, EDB or PCB?

Dr. HOUK. We are not actively establishing that. We are in the process of looking at it to see if it is worthwhile establishing one for the trichloroethylene, if the population is going to be big enough.

Senator DURENBERGER. Dr. Moore, can we come back to you on the example?

Dr. MOORE. I have a statement that says I don't have examples. I can provide some.

Senator DURENBERGER. If you would, I would appreciate it. Dr. Goldstein, let me ask you, maybe I get more bothered than I should about the fact that certain departments have jurisdiction over one thing, this whole pesticide, insecticide, rodenticide thing probably bothers us as much as it bothers you. In view of the lack of health and safety data submitted on pesticides and, on the other hand, their widespread presence, what efforts is EPA making to support research on the health effects of pesticides?

Dr. GOLDSTEIN. There are a number of different efforts going on. Probably our major effort in this area related to ground water level is in trying to find out whether certain things persist and certain things don't persist. The effort in the pesticide area has generally been on general titles; they haven't been on specific compounds, except when such compounds come to public attention.

We are doing things with chemicals, human exposure with a series of studies, but we are not doing anything directly having to do with the kind of studies that Dr. Houk mentioned, epidemiological studies which would look at humans exposed to these types of pesticides.

Senator DURENBERGER. Is there a necessity for someone to do that?

Dr. GOLDSTEIN. Oh, certainly.

Senator DURENBERGER. Where would we—all of us—logically place that responsibility if we wanted to see that it got done?

Dr. GOLDSTEIN. Sir, I simply have been in the Federal Government too short a time to be able to answer that.

Senator DURENBERGER. You have been in long enough to know not to answer it.

Jack, let me ask you the MCL question again with regard to aldicarb, EDB, and PCB. Where are you, where are you headed?

Mr. RAVAN. Senator, with aldicarb and other pesticides of this type, we will be in what we call phase II which is a group of similar compounds, and we are at the phase where we have announced to the world in the Federal Register what we intend to do to this particular group. It includes EDB and aldicarb.

Dr. HOUK. Senator.

Senator DURENBERGER. Yes; Dr. Houk.

Dr. HOUK. The question of who should do it, I think that is not the critical question. The critical question is how can it be done. There are two things that are difficult, may be difficult in this area. One is to

measure exposure. In chemicals that are not persistent in the body, you have to be there when they are exposed, and you have to measure the metabolite of that chemical, where it is in the body, the urine, et cetera, know what that metabolite is or you may miss it.

The real hindrance of doing long-term studies is our inability in this country to keep track of people in the long term. Thirty percent of this population moves each year. Eight percent of the population moves across State lines. And to keep repetitively finding the people needs a system with which the legislators, the Congress is going to have to work out a system that we can do that and still insure privacy, which is a very great concern of these individuals.

The third is where we have persistent chemicals in the body that we can measure, there is a great deal of concern and a great deal of stuff in the press about measuring dioxin in fat. We can do that in our laboratory at parts per trillion level which is the level we need to do it. What it takes is 1.4 million dollars' worth of dedicated equipment with annual maintenance agreements of \$300,000, and the equipment will be obsolete in 3 years; a staff of 5, 2 at the Ph.D. level and 3 just below the Ph.D. level, and on a good week, we can output 15 specimens. This is not like doing a blood count. It is not that easy.

Senator DURENBERGER. Is this the kind of problem you are going to deal with at this meeting on Friday you talked about earlier?

Dr. HOUK. No; this will be a different thing with the registries.

Senator DURENBERGER. I just encourage you as you explore that whole issue that you keep this subcommittee informed of whatever progress you and your associates and others might make by way of coming up with some form of a system that will be helpful to all of us.

Let me go to surface impoundments and, Dr. Skinner, you already testified the contaminant problems of hazardous waste sites, solid waste disposal sites, so forth. You have the authority to regulate hazardous waste facilities under RCRA and under Superfund. I want to take you to a letter from Congressman Broyhill which you stated with respect to surface impoundments:

An estimated 95 percent of all currently operating sites are located within a quarter mile of a drinking water supply.

Dr. SKINNER. That is an estimate we made; that is correct.

Senator DURENBERGER. How many of the sites on the Federal Superfund list were used at one time as surface impoundments?

Dr. SKINNER. 116 of them do have surface impoundments at the sites, in addition to other activities as well, of the 546 on the national priority list.

Senator DURENBERGER. 116 out of?

Dr. SKINNER. 546.

Senator DURENBERGER. How many cases of ground water contamination from surface impoundments have been reported to EPA?

Dr. SKINNER. From Superfund facilities or in general?

Senator DURENBERGER. Why don't you give me both.

Dr. SKINNER. I have data for the Superfund facilities, the number of facilities both surface impoundments, landfills and others at which ground water contamination has been detected at. That is 410 out of 546 on the national priority list, but that is more than just surface

impoundments. I don't have breakdowns specifically for surface impoundments.

All other types of facilities, I don't have that with me right now. We will try and develop that.

Senator DURENBERGER. Would we be in the ballpark if we said over one-third of the documented cases that affect municipal or drinking water supplies?

Dr. SKINNER. I have heard estimates like that; yes.

Senator DURENBERGER. Do you have any reason to argue with them?

Dr. SKINNER. No, I don't.

Senator DURENBERGER. According to a 1977 EPA study entitled "Waste Disposal Practices and Effect on Ground Water Report to Congress," over 100 million gallons of industrial waste leaked from surface impoundments each year and into ground water. Would it be fair to conclude that a large portion of those wastes are hazardous?

Dr. SKINNER. They probably are not hazardous, according to a regulatory definition of hazardous waste. They may, in fact, pose problems to drinking water supplies.

Senator DURENBERGER. What do the current RCRA regulations require existing or interim status facilities to do to protect against ground water contamination?

Dr. SKINNER. The interim status facilities, the existing facilities before they receive a permit, are required to monitor the ground water and that monitoring information is then used for establishing priorities for issuing the permit to the facility, and at that time, they are required to take corrective action if the ground water is contaminated, new units are required to line with impermeable liners.

Senator DURENBERGER. What is the requirement regarding a new facility?

Dr. SKINNER. A new facility would be required to have a permit before they can begin construction. They would have to line the facility; they would have to carry out a ground water monitoring program. If there was contamination, they would have to have a corrective action program to remove that contamination.

Senator DURENBERGER. If they use two liners, do they have to monitor?

Dr. SKINNER. If they use a double-liner system, they have to have a leak detection system between the two liners, and in that instance, they do not have to monitor the ground water.

Senator DURENBERGER. On September 21 of this year, a GAO report on hazardous waste facilities stated,

Recent EPA study based on a nationwide sample concluded there has been considerable noncompliance with ground water monitoring requirements.

Continuing the quote,

EPA also concluded there may have been inadequate justification for some of the existing waivers to these requirements.

That is the end of the quote.

Is it true that approximately 60 percent of surveyed RCRA facilities are not in compliance with EPA ground water requirements?

Dr. SKINNER. Yes, that report is based upon a survey that we did in 1982 of 190 facilities that we did find a very high noncompliance

rate of approximately 60 percent, greater than 60 percent were not in compliance with the standards.

Senator DURENBERGER. Then given the technical complexity, which I presume—I may be incorrect—of installing and operating monitoring wells properly, should we rely only upon monitoring to protect against contamination?

Dr. SKINNER. No, I think we should also rely upon lining those facilities to prevent discharge and for certain wastes we should probably prohibit the waste in the impoundment in the first place.

Senator DURENBERGER. Are there any other leak detection systems or methods out there other than ground water monitoring?

Dr. SKINNER. There are systems that are used to detect leakage in the so-called unsaturated zone before you reach the water table. There are different types of techniques that can do that in that zone, but it requires installation under the facility prior to construction in most instances.

Senator DURENBERGER. Do you have available to you any kind of an economic analysis, usually called CBA, cost benefit analysis, that would tell us whether or not after the fact cleanup of contaminated ground water is more complicated or more costly than before-the-fact prevention? I might logically jump to that conclusion, but if you tell me it is terribly expensive to monitor and do a variety of other things, what is the appropriate conclusion?

Dr. SKINNER. I don't have any quantitative estimates, but cleanup of ground water once contamination occurs is very, very expensive. In some instances, it is technically impossible to do completely depending upon the geology. It may require many, many wells and pumping for very, very long periods of time.

So it is very conceivable that prevention from the outset is more cost effective.

Senator DURENBERGER. If a RCRA interim status surface impoundment is discovered to be leaking, you could require corrective action as a condition of the RCRA permit. How long will it take to issue permits to all RCRA interim status facilities if you did that?

Dr. SKINNER. To all facilities—let me give you a couple of examples. For an individual facility, a facility that is required to monitor ground water, from the time we request the permit application to the time we actually complete the permit and issue it, it is probably greater than 2 years. To do all facilities at the current resource levels, all ground water monitoring of the facilities would probably take us 4 to 5 years. To do all other facilities, including storage facilities, incinerators, it would probably take us greater than 9 to 10 years.

Senator DURENBERGER. Do you believe more stringent liner requirements for surface impoundments are desirable to prevent future contamination of ground water?

Dr. SKINNER. Yes, I do, and I believe existing units should be required to line as well, and we are moving to develop regulations along those lines.

Senator DURENBERGER. Jack, the Agency's draft surface impoundment assessment estimated there are 26,000 active industrial impoundments. I presume I am correct on that. What type of wastes are contained in the 26,000 impoundments?

Mr. RAVAN. Senator, we broke those impoundments into some half dozen categories—industrial, 15 percent; municipal, 20—rounding these percentages; agriculture, 10; mining was 13; oil and gas was 36; and all others about 3 percent.

So across the spectrum, you could find most anything that you want to in the environment. The industrial category of impoundments, some of them were for storage, some disposal, some for treatment purposes, and I think you will find that the case in the other categories as well.

Senator DURENBERGER. What would we find regarding the hazardous nature of the waste? Is there any way to know as we go across those 26?

Mr. RAVAN. Not that particular assessment, Senator. The data was gathered, as I understand it, 1979, 1980. It has been compiled since that time, and I will also add a note of caution, certainly it welled up within me as I received a briefing on how the assessment was conducted, certainly it could be characterized as a desk-top type accounting and assessment based upon two or three sources of data and very little, if any, field examination of these sites was conducted. Therefore, I would not be able to tell you what actually is in those impoundments. I think we can probably find most anything.

Senator DURENBERGER. What regulations would protect against ground water contamination as applied to the 26,000 impoundments?

Mr. RAVAN. At the present time, very little receive regulation of those impoundments, Senator. Obviously, if they begin to discharge on the surface, then we can get at that with the Clean Water Act. If they do, in fact, quality or somehow are identified to Dr. Skinner and his group as the sites he just enumerated to you, then we have an ability through his regulations, Superfund, or RCRA.

Senator DURENBERGER. In a letter dated October 17, 1983, from the Administrator to Congressman Waxman, the Administrator agreed surface impoundments pose a serious threat to ground water and urge that the Agency be allowed "to launch a major study" to assess problems with surface impoundments.

How long would such a study require to be completed? I take it you are aware of the letter?

Mr. RAVAN. Yes, sir. The length and depth of the study and funding, all of that wraps into the question that you posed to me. I honestly don't know. The better study we do, obviously, the little bit longer of time, incremental time will be required.

Senator DURENBERGER. Do you want to ballpark it? One, four, eight, seven, two?

Mr. RAVAN. Yes, sir, I was trying to get to that point, but I wanted to give you some feel of how I might arrive at it. I would think to do a good study, get a good assessment for what is out there, a good description of what is out there, what is contained in those impoundments, some ability to characterize those wastes, and so forth, 2 years. One year or more to actually do the work. That also obviously indicates to you and everyone else an adequate resource base must be made available to do it and then get the data back in, assess it and find out what is true, false, et cetera, might require the better part of 2 years.

Senator DURENBERGER. Then after the 2 years, we start this process we were talking about before of another 4 to 6 years, whatever it is, before we have regulations in place: is that right?

Mr. RAVAN. Possibly, Senator, but not necessarily. If, in fact, we could identify and know for sure, based on that study, that there is everything from an imminent hazard for a need for a regulator program put in place with Federal/State relationships, et cetera, yes, that protective level could take anywhere from 1 year to 4 years.

Senator DURENBERGER. Is there now money in the 1984 proposed budget to do that study?

Mr. RAVAN. Not that I am aware of; no, sir.

Senator DURENBERGER. Then why does the Administrator seem so excited about doing a major study to assess problems of impoundment?

Mr. RAVAN. I think Administrator Ruckelshaus was correct in his assessment to Congressman Waxman. What he was saying was give me a chance to find out what the problem is, better define the problem before you lay another regulatory program on me. That is the essence and basis of his answer.

Senator DURENBERGER. But there is not a plan to do this study right now? He is just telling Henry, don't do anything until we have got a study?

Mr. RAVAN. He is saying to Congressman Waxman, give me a chance to define the problem, then I will tell you whether or not, one, I have tools in hand to regulate or, second, if I don't, then give me the tools that I need. That is a commitment, Senator, that regardless of the budgetary process or what it might take to put those resources into that study, that study will be done, we will find the resources to conduct that study.

Senator DURENBERGER. Why don't we hold until the end of the 30 days, the next time we get together to look at your study, some specifics regarding the answer to that question, whether we know something about time lines, and we know something about resources, financial and otherwise.

Mr. RAVAN. I appreciate your allowing me to do that, Senator, because I think within that 30-day period of time, I will be able to provide you with specifics and the outline of the study.

Senator DURENBERGER. Let me go to underground storage tanks. I think we have the information from your statement, Jack, on the 1.2 million tanks that are now in place down there. The leakage is 75,000 to 100,000 and growing—that is the number that are leaking. We have a lot of examples on the record, unless somebody wants to add to the record of specific cases, where gasoline has escaped and contaminated the ground water. I think we have on the record from Dr. Houk some testimony about the health concerns, and you may want to elaborate. It seems to me you did talk about the problems with EDB in trying to get lead out of our gasoline. I believe you may have talked about benzene at least as an animal carcinogen. Is there anything I am missing as far as the health concerns about leaking of gasoline?

Dr. HOUK. Very much concern but not only from the chemical point of view but in some instances the physical point of view. If the concentration is high enough, they can produce explosion.

Senator DURENBERGER. Now, Jack, let me go back and pick on you some more. Again, this is back to the issue of how we are going to deal

with this problem. What authority is there in the Clean Water Act to deal with leaking tanks?

Mr. RAVAN. Not very much in the Clean Water Act, Senator. We probably will have to get at leaking underground storage tanks through some other mechanism. I believe some of my colleagues here have some opportunity to comment on approaches that might work. The Clean Water Act would only apply if we could get those discharges basically to the surface so we could bet at them and it could flop over into surface waters, perhaps.

Senator DURENBERGER. Let me go to section 311(j) of the act which allows regulations to establish procedures, methods, and equipment and other requirements for equipment to prevent discharges of oil and hazardous substances and to contain such discharges.

Is that the only thing we have available to us and has it ever been used to deal with underground storage leaks?

Mr. RAVAN. Not to my knowledge, Senator, it has not been used.

Senator DURENBERGER. Is there any other authority in the Clean Water Act? Section 205(j) authorizes grants to States for water quality management. I think when we were going through the budget, you made some—

Mr. RAVAN. Let me break that apart. My answer was trying to get at regulatory functions under Clean Water Act. There are portions of Clean Water Act in the funding and/or 208 planning that might help the States to get at the problem of identifying, quantifying the proportion of the problem. I don't know any regulatory mechanism in the Clean Water Act to get at the underground storage tanks.

Available to them would be 205 funding to help set up a State program to look at this problem.

Senator DURENBERGER. I know there are some members of this committee who have been at this problem a whole lot longer than I have who couldn't be here today since we scheduled this in the middle of an adjournment period who are deeply concerned about this issue. I wonder if you wouldn't, for the record of this hearing, go back and take a specific look at the Clean Water Act and look at it in terms of what you believe you or someone else can do under the present provisions and what changes in the Clean Water Act provisions might be helpful to help us solve these problems. Dr. Houk.

Dr. HOUK. The storage tanks generally, Senator, require some sort of a system to get to, and I found a citation, 49 CFR 15, for the transportation of hazardous liquids, contains language that requires all companies to monitor the input and the output of the hazardous materials and to report any losses to the Department of Transportation.

Senator DURENBERGER. That is how we got the DOT in Boise, Idaho.

Dr. HOUK. Yes.

Senator DURENBERGER. But all that is, is a reporting requirement; is that it? Does anybody know what DOT is supposed to do with these reports as in the Boise situation?

Dr. HOUK. But at least that is a citation?

Senator DURENBERGER. Yes, thank you. Does anybody know the answer to the DOT involvement?

Mr. RAVAN. No, sir, I don't.

Senator DURENBERGER. Do you want to make a commitment to dig this whole issue up for a little bit more?

Mr. RAVAN. Yes, sir.

Senator DURENBERGER. Let me ask you, Dr. Skinner, about RCRA. Are there any provisions in RCRA that would be useful to regulate underground storage tanks?

Dr. SKINNER. Both under RCRA and Superfund, there are enforcement actions that can be taken in the case of imminent hazards where there has been a discharge. Again, that would be after the fact. In RCRA, we have the authority to regulate storage tanks, underground and above ground, that contain hazardous wastes, and we have put out some limited regulations for underground hazardous storage tanks.

We are in the process of revising those regulations to make them more extensive. That would be for waste, not products in general.

Senator DURENBERGER. What about the TSCA? Have you got anything available to us there?

Dr. MOORE. Senator, it is felt TSCA may provide some authorities to address some of the leaks in underground storage tanks concerned. TSCA is oriented toward regulating specific chemicals so any action we would take in that regard would have to be on a particular chemical basis rather than underground storage tanks in general. And, indeed, may be a byproduct, if you will, of the ground water initiative of the task force. This is coming up with a document to identify a subgroup of what to look into. We are exploring what needs to be done to address this problem under TSCA and we are actively coming up with a plan which is going to be in draft form and presented within the Agency some time in the second week in December.

Under certain sections of TSCA, it is felt one could attack it on a chemical-by-chemical basis, gasoline being considered a chemical, rather than petroleum in general.

Senator DURENBERGER. You don't have to get it down to benzene?

Dr. MOORE. Probably not under gasoline. When you look into the other things of concern that might be leaking out of underground tanks, such as the solvents, there, I think, you have to go on a one-by-one basis. Indeed, part of the task has been assigned to the group that is scoping this right now is, once one leaves the gasoline or specific petroleum products, which of the solvents, for example, does one want to focus on to see what is the problem or the size of the problem?

Senator DURENBERGER. I am informed that our reading of TSCA is, you don't have to go one by one, that you can go by a class, or are we just trying to define what a class is here?

Dr. MOORE. We could look into that.

Senator DURENBERGER. Dr. Houk, back to the registry question. Has HHS established any registries of persons who were exposed to leaks of oil or gas which contain known carcinogens?

Dr. HOUK. We have not.

Senator DURENBERGER. Under the Safe Drinking Water Act, Jack, EPA is required to establish maximum contaminant levels for contaminants of drinking water. Where are we on MCL's on oil and gasoline or benzene or EDB?

Mr. RAVAN. In both aldicarb and EDB, Senator, we are in phase II. That preannouncement has been made just very recently in October 1983, and will require the amounts of time we talked about earlier. I know of no inclusion in any of these phases for gasoline as such. Perhaps some of the additives will be included.

Senator DURENBERGER. Let me conclude my questions with some questions regarding TSCA. Jack, in 1981, the Council on Environmental Quality issued a report entitled "Contamination of Ground Water by Toxic Organic Chemicals." The data for that report was provided by EPA's regional offices. Is that correct, or is that not correct?

I thought I saw a shaking head behind you somewhere, if you want to turn around.

Mr. RAVAN. Senator, I don't know. I can't confirm that report. My staff informs me that you are partially correct, but the data for that report came primarily through the Office of Drinking Water.

Senator DURENBERGER. The EPA data at that time showed over 30 toxic organic chemicals in drinking water wells often at very high concentrations. My question is, is this count of toxic organic chemicals in drinking wells roughly accurate or has any new count been made since that time?

Dr. COTRUVO. There was a survey of 1,000 communities reported in 1982 and in that survey, which was a review of about 30 organic chemicals, what we found in sum was that approximately 20 percent indicated some detectable amount of one or more chemicals. That means as low as, perhaps, one-tenth of one part per billion. About 5 percent had a total of five parts per billion or more. So that is the rough breakdown of the findings.

Senator DURENBERGER. That is 50? You had an example of 1,000?

Dr. COTRUVO. Yes.

Senator DURENBERGER. Of this number that we are talking about here, I gather some of them are pesticides, but many of them are regular industrial chemicals; is that a correct conclusion?

Mr. RAVAN. Pretty much all in the solvent categories.

Senator DURENBERGER. For how many of these toxic organic chemicals has EPA promulgated final recommended contaminant levels or just the MCL's under the Safe Drinking Water Act?

Mr. RAVAN. Final regulations, sir?

Senator DURENBERGER. Right. Is the answer zero?

Mr. RAVAN. The final is zero; that is correct.

Senator DURENBERGER. Do you have adequate data on toxicity so that you could, if you wanted to, set MCL's for all of these chemicals?

Mr. RAVAN. Senator, I would like to give you a more complete answer, but my understanding thus far is that in every case, we do not have absolute, complete data. I think some of the testimony indicated earlier, we do have enough data to indicate that if we can group these chemicals, as, for instance, in a group of solvents or pesticides, and so forth, we are on sound enough ground to go ahead and propose the levels necessary for public health protection.

Senator DURENBERGER. I wonder if with regard to this one you might add some specificity. I won't ask you the time line question again, but I would appreciate that kind of information regarding the toxicity that we are talking about, toxicity level we are talking about on all of these chemicals. I would like that for the record.

Mr. RAVAN. Yes, sir, I will provide that. For the chemicals involved and all the phases, I will provide you with specific data on each one of these and how we were able to group them by category and proceed.

Senator DURENBERGER. Dr. Moore, the Toxic Substances Control Act establishes a national policy that chemical manufacturers are responsible for developing toxicity data on the chemicals they produce and the act gives EPA the authority to require testing.

Now we have known about some of these organic contaminants we have been talking about here since the mid-1970's or since about the time TSCA was passed. How many of the drinking water contaminants are the subject of—

Dr. MOORE. Senator, I will have to provide that for you.

Senator DURENBERGER. Could you provide that for the record. Would you do the same thing with negotiated testing agreement?

Dr. MOORE. Yes.

Senator DURENBERGER. Has the Office of Water requested your office to use the TSCA authorities to require testing of these drinking water contaminants to help them set MCL?

Dr. MOORE. Senator, when a chemical has been identified by the ITC under section 4 that need additional testing, as the Office of Toxic Substances goes about taking that recommendation and decides this position is needed, it does involve representatives from the Office of Water as well as other segments of the Agency, and, in some instances, the representatives from the other areas have identified a particular chemical that has been identified by the ITC to, indeed, broaden what Toxics might ask for to provide data that might be welcome.

It has been add-ons, if you will, once chemicals have been identified by the interagency testing committee as opposed to them coming and saying we have a particular chemical we would like to do a section 4 on. Toxics has made provisions in its current fiscal year budget to receive two such requests and has the manpower available to generate such data, whether it be from Water or some other media source.

Senator DURENBERGER. Dr. Skinner, your office is responsible for Superfund cleanup of hazardous waste sites and ground water monitoring. At both active and abandoned sites, you often find organic chemical are escaping into the ground and ground water. At some point, you must have to evaluate how serious the contamination is and also to determine the extent of cleanup that is necessary to protect the public, and I will assume that is a routine part of your job.

Do you know what a safe level is for each of the contaminants that you encounter that are leaking from dump sites?

Dr. SKINNER. For active sites, we set a level of no statistical increase over background under RCRA unless the operator of the site can come in and through a risk assessment and health information demonstrate otherwise.

For inactive sites under Superfund, that is done on a case-by-case basis doing a risk assessment. I personally am not knowledgeable about the actual levels used for different types of chemicals.

Senator DURENBERGER. What I am trying to get at with these two questions is how you use each other, as I trust you know by now. Have you ever had the opportunity to go over to the Office of Toxic Substances and say, "I am finding chemical X leaking from dumps, and I need to know how toxic it is. Would you please require manufacturers of that product to provide me with that data"? Have you had that kind of experience?

Dr. SKINNER. We always share the information the other offices have when we set levels and regulatory standards.

Senator DURENBERGER. That wasn't my question. My question was, if it isn't in the shared information that you always seem to share with each other, but you run across a particular chemical that you haven't shared information on, do you ever go over to the Toxic Office and say, "Hey, would you please require them to do some tests and provide us with that"?

Dr. SKINNER. I am sure that happens, but I can't give you specific examples of that.

Senator DURENBERGER. Dr. Goldstein, does the Office of Research and Development have the resources right now to get the work on all the toxicity and chemical testing that is needed to establish these safe levels for ground water contaminants we have been talking about?

Dr. GOLDSTEIN. We certainly have resources in the area and certainly using those resources. Having an academic background, I feel more research is needed. I am sure we could develop a research protocol with almost any amount of funds given us, sir.

Senator DURENBERGER. Will we find out in 30 days whether you are or not?

Dr. GOLDSTEIN. Again, it is a question of what research needs and priorities are involved to do this. Do you want us to relook at our priorities?

Senator DURENBERGER. No; I am trying to determine from this whole variety of questions here where the agency is maximizing the utilization of all its resources, and in Mr. Ravan's opening statement, there is a great deal of commitment—it looks like there are task forces and risk assessments and procedures and peer review coming out your ears over there, and it sounds really terrific.

By this set of questions, I am trying to establish the degree to which internal resources in the largest sense are being utilized, how these various acts that we have enacted, none of which gets only at the ground water problem, but each gets a little piece of it, how they might be facilitating or impeding your operation and then in your case, I guess, how you go about prioritizing within this process your own judgment about what research and development will do the most good across this wide field of endeavor that everyone has been engaged in. That really is the purpose of the question.

The specific question I asked you addressed at the latest line of questioning determining a safe level for contaminants. I heard your answer to be, yes, we have got the resources, but I didn't hear an answer, because I didn't ask the question, of whether or not you already made this a priority within the process to facilitate the determination of safe level for contaminants.

Dr. GOLDSTEIN. Certainly the research process—the research and development process—works with the program offices. We actually don't decide by ourselves on any of our funding; we decide with the regulatory program offices what is to be done and through that process, a set of priorities is developed.

In my looking through the record and the attention paid to ground water, a recognition by ORD that it was a research priority or was

more or less a priority of something else is just something I can't in retrospect tell you.

Certainly there is clear indication for the record it ought to be an area of interest and an area that is looked at from a crosscutting type of approach rather than sticking it in one particular office.

Dr. MOORE. Could I add something to that?

Senator DURENBERGER. Sure.

Dr. MOORE. In getting briefed, if you will, for the position I recently came to, the one thing I was made aware of there is a committee between the Office of Pesticides Program and OR&D's counterpart. One of the major activities they have agreed upon that OR&D will look at is, indeed, relevant to the ground water issue whereby some of the models that are used to estimate, if you will, whether something will contaminate ground water is to validate one of the models that has been generated and indeed OR&D—I think this is one small example where there does appear to be one.

Senator DURENBERGER. Dr. Skinner, before I leave my question about how you use OTS would you provide for the record some examples of requests that you have made to OTS for testing?

Dr. SKINNER. Certainly.

Senator DURENBERGER. Dr. Houk.

Dr. HOUK. I think, Senator, in setting standards for EPA, one also has to bear in mind that many of these compounds are very difficult to measure and require very sophisticated laboratory equipment and personnel to do so. And part of the process of having a standard is to insure there are sufficient laboratories throughout the country that can adequately measure the particular compound in question. At least this is from my own perspective, if you don't have laboratories to measure something, it doesn't do much good to say you should measure it.

Senator DURENBERGER. My last question deals with the utility of TSCA. Since we have this in the subcommittee, responsibility to reauthorize, and we only reported out a number so far, it strikes me TSCA was intended to gather the data that is needed to support all of EPA's chemical regulatory program. It seems to be also each of the EPA people here and the air folks as well ought to be using TSCA to obtain the test data that you need in the various areas to regulate chemicals under your authority, and TSCA has now been on the books, I guess, 7 years.

I am curious to know if any of you know why there hasn't been much more active effort to use TSCA to support these programs? Is it a fault in the act or somewhere else in the process?

Dr. MOORE. I can speculate, offer speculation. I don't know if it is true. For whatever reason, TSCA was a little bit behind early on in responding to the chemicals that had been identified by the ITC list and in order to stimulate the Agency to be a bit more prompt, some of our private sectors enjoined the U.S. courts to stimulate the Agency to great effect and, indeed, for the last couple of years, they have focused most of the TSCA activities under section 4, which is really what you are referring to to "cleaning up that backlog" as well as keeping abreast of the new chemicals that were generated.

As a result of that, I doubt people in TSCA went out and solicited additional work within EPA since they were having a hard time keep-

ing up. The bright side of that is many of the chemicals identified through this process probably do have cost relevance to the Agency.

Second, I am told that, come the end of December, we will have caught up with the court-ordered cleanup and will now be at least equal to the game rather than behind.

Senator DURENBERGER. Does anybody else have a comment on that question? Does anybody else have a final statement they want to make? Usually nobody does. I always give you that opportunity.

I appreciate very much the effort that all of you put into this hearing. Dr. Houk, thank you not only for your testimony, but your advice. I want to thank all four of the people from EPA for their commitment, first of all, just for being here under these circumstances, and I don't mean being here, I mean being in Washington at this particular time. We will certainly look forward to the release of the Agency's commitment to the ground water, and I think you can tell from the record of this committee and of this subcommittee, there is a commitment here on our part to facilitate whatever work and the resources that go with that, particularly now in the area of ground water.

So we would be happy to be able to facilitate that process after we hear the direction you intend to go. And we may well—as I indicated to the Administrator on the telephone the other day—we may well schedule a hearing in connection with the release of that information so that we can not only inform ourselves, but a wider public on the Agency's commitment and, I hope, the administration's commitment to ground water.

I see in the paper that toxicity is now the big thing, and I think that is appropriate. If we can help during the course of 1984 when we try to put substance behind all those shelved reauthorizations, we can help that process in some way; I guess that is what we were elected to do.

Thank you all for being here. The hearing is adjourned.

[Whereupon, at 4:39 p.m., the subcommittee adjourned.]

[Material submitted for the record and responses to additional questions follow:]

ANNUAL SUMMARY 1982
ISSUED AUGUST 1983

CENTERS FOR DISEASE CONTROL

Water-related Disease Outbreaks

SURVEILLANCE



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES • Public Health Service

1. INTRODUCTION

Since 1971 the Centers for Disease Control (CDC) has tabulated foodborne and waterborne disease outbreak data separately and reported these data in annual reports. The Water-related Diseases Activity has set the following goals: 1) to determine the frequency of epidemics of water-related diseases in the United States, 2) to characterize the epidemiology of water-related diseases, 3) to disseminate information on prevention and control of water-related diseases to appropriate public health personnel, 4) to train federal, state, and local health department personnel in epidemiologic techniques for the investigation of water-related disease outbreaks, and 5) to collaborate with local, state, other federal and international agencies in initiatives concerning prevention of water-related diseases. Also included in the responsibilities of the Water-related Diseases Activity is the investigation of outbreaks of acute gastrointestinal disease on ocean-going vessels.

II. WATERBORNE DISEASE OUTBREAKS, 1982

In 1982, 20 states reported 40 outbreaks of waterborne disease involving 3,456 cases to the Centers for Disease Control (CDC).

A. Definition of Terms

A waterborne disease outbreak is an incident in which 1) 2 or more persons experienced similar illness after consumption or use of water intended for drinking, and 2) epidemiologic evidence implicated the water as the source of illness. In addition, a single case of chemical poisoning constitutes an outbreak if laboratory studies indicated that the water was contaminated by the chemical. Only outbreaks associated with water intended for drinking are included.

Community public water systems (municipal systems) are public or investor-owned water systems that serve large or small communities, subdivisions or trailer parks of at least 15 service connections or 25 year-round residents. Noncommunity public water systems (semi-public water systems) are those of institutions, industries, camps, parks, hotels, or service stations that may be used by the general public. Individual systems (private water systems), generally wells and springs, are those used by single or several residences or by persons traveling outside populated areas. These definitions correspond to those in the Safe Drinking Water Act (PL 93-523) of 1974.

B. Sources of Data

State health departments report waterborne disease outbreaks to CDC on a standard reporting form (Section J). In addition, the Health Effects Research Laboratory of the Environmental Protection Agency (EPA) contacts all state water-supply agencies annually to obtain information about waterborne disease outbreaks; information from both sources is included in this report. Representatives from CDC and EPA review and summarize outbreak data and also work together in the investigation and evaluation of waterborne disease outbreaks. In addition, upon request by state health departments, CDC and EPA offer epidemiologic assistance, provide consultation in the engineering and environmental aspects of water treatment, and, when indicated, collect large volume water samples for identification of viruses, parasites, and bacterial pathogens.

C. Interpretation of Data

The limitations of the data in this report must be appreciated to avoid misinterpretation.

The number of waterborne disease outbreaks reported to CDC and EPA clearly represents a fraction of the total number that occur. Since investigations were

sometimes incomplete or conducted long after the outbreak, the waterborne hypothesis could not be proved in all instances; however, it was the most logical explanation in these outbreaks. The likelihood of an outbreak coming to the attention of health authorities varies considerably from 1 locale to another depending largely upon consumer awareness, physician interest, and disease surveillance activities of state and local health and environmental agencies. Large interstate outbreaks and outbreaks of serious illness are more likely to come to the attention of health authorities. The quality of investigation conducted by state or local health departments varies considerably according to the department's interest in waterborne diseases and its budgetary, investigative, and laboratory capabilities. This report should not be the basis for firm conclusions about the true incidence of waterborne disease outbreaks, and it should not be used to draw firm conclusions about the relative incidence of waterborne diseases of various etiologies. The number of reported outbreaks of different etiologies may depend upon the interest of a particular health department or individual. For example, if an epidemiologist or microbiologist becomes interested in *Giardia lamblia* or Norwalk-like viruses, he is likely to confirm more outbreaks caused by these agents. Furthermore, a few outbreaks involving large numbers of persons may vastly alter the relative proportion of cases attributed to various etiologic agents.

These data are helpful, however, in revealing the etiologies of reported waterborne disease outbreaks, the seasonality of outbreaks, and the deficiencies in water systems that most frequently result in outbreaks. As in the past, the pathogens responsible for many outbreaks in 1982 were not determined. It is hoped that more complete epidemiologic investigations, advances in laboratory techniques, and standardization of reporting of waterborne disease outbreaks will augment our knowledge of waterborne pathogens and the factors responsible for waterborne disease outbreaks.

D. Analysis of Data

In 1982, 40 waterborne disease outbreaks involving an estimated 3,456 persons were reported to CDC and EPA. This is a decline in cases, but an increase in the number of reported outbreaks compared with the previous year (Table 1).

Table 1 Waterborne Disease Outbreaks, by Year and Type of System, United States, 1971-1981

	Community	Noncommunity	Private	TOTAL	TOTAL CASES
1971	5	10	4	19	5182
1972	10	18	2	30	1650
1973	5	16	3	24	1784
1974	11	10	5	26	8363
1975	6	16	2	24	10879
1976	9	23	3	35	5068
1977	12	19	3	34	3860
1978	10	18	4	32	11435
1979	23	14	4	41	9720
1980	23	22	5	50	20008
1981	14	16	2	32	4430
1982	22	12	6	40	3456
TOTAL (%)	150 (39)	194 (50)	43 (11)	387	85835

Twenty states, including Puerto Rico, reported at least 1 outbreak (Section H). Colorado reported more outbreaks than any other state (8/40 = 20%).

Table 2 shows the number of outbreaks and cases by etiology and type of water system. Of the 40 outbreaks, 16 (40%) were of unknown etiology and were designated as "acute gastrointestinal illness" (AGI). This category includes outbreaks characterized by upper or lower gastrointestinal symptoms for which no etiologic agent was identified. The etiologies of the remaining 24 (60%) outbreaks were confirmed: *G. lamblia* (12), Norwalk agent (4), chemical (2), Hepatitis A (3), *Shigella* (2), and *Yersinia* (1).

Table 2 Waterborne Disease Outbreaks by Etiology and Type of Water System, 1982

	Public Water Systems		Private Water Systems		Total	
	Community Outbreaks	Noncommunity Cases	Outbreaks	Cases	Outbreaks	Cases
AGI*	6	669	9	1117	1	50
<i>Giardia</i>	9	497	2	60	1	4
Chemical	0	0	0	0	2	18
Norwalk	4	750	0	0	0	0
Hepatitis A	2	93	0	0	1	10
<i>Shigella</i>	1	19	1	153	0	0
<i>Yersinia</i>	0	0	0	0	1	16
Total	22	2028	12	1330	6	98
					40	3456

*Acute gastrointestinal illness of unknown etiology

Results of microbiologic testing of water samples were reported in 28 of 37 nonchemical outbreaks; evidence of contamination (presence of coliforms or pathogens) was found in 25 (89%). Water sample filtration for *Giardia* cysts was performed in 5 of the 12 *Giardia* outbreaks; cysts were found in all 5.

Most outbreaks involved community (55%) and noncommunity (30%) public water systems. Outbreaks attributed to water from community public water systems affected an average of 92 persons compared with 111 persons in noncommunity public water system outbreaks and 16 persons in outbreaks involving individual water systems (Table 2). Use of untreated or inadequately treated water was documented in 30 (75%) of the outbreaks (Table 3). Outbreaks occurred in every month of the year but most frequently in July through September (Table 4).

Table 3 Waterborne Disease Outbreaks, by Type of System and Type of Deficiency, 1982

	Public Water Systems		Private Water Systems	Total
	Community Outbreaks	Noncommunity Outbreaks		
Untreated surface water	2	3	0	5
Untreated ground water	4	3	4	11
Treatment deficiencies	9	5	0	14
Deficiencies in distribution system	5	0	0	5
Miscellaneous	1	0	2	3
Multiple deficiencies	1	1	0	2
TOTAL	22	12	6	40

Table 4 Waterborne Disease Outbreaks, by Month of Occurrence, United States, 1982

Month	Number of Outbreaks	Month	Number of Outbreaks
January	3	July	7
February	3	August	4
March	2	September	5
April	5	October	3
May	3	November	2
June	3	December	0
		Total:	40

Outbreaks in recreational areas continued to be a problem in 1982, accounting for 15 (38%) of the outbreaks. Of the 12 outbreaks associated with noncommunity public water systems, 8 implicated water supplies at recreational areas at camps and campgrounds (4), ski or ranch resorts (2), 1 truck stop/restaurant, and 1 country club.

In 8 of the 16 outbreaks of acute gastroenteritis of unknown etiology an incubation period was reported. In all but 1 instance the median incubation period was less than or equal to 48 hours, and the mean was approximately 33 hours.

Two interesting episodes that did not meet the definition of a waterborne outbreak, but may well have been examples of waterborne transmission, occurred in 1982. In December over 200 cases of acute gastrointestinal illness in children in a middle school in Ohio were suspected but not proven to be related to the water system. *Salmonella typhimurium* was isolated from 45-50 residents of 1 district in Oklahoma in late 1982; epidemiologic investigation suggested that residents using tap water in the town had higher a incidence of diarrhea than did persons using municipal water in a neighboring town.

E. Comments

The increase in the number of outbreaks reported in 1982 may well be due to more complete reporting rather than an actual increase. The waterborne disease surveillance system is, for the most part, a passive one. There is evidence to suggest that this report contains only a small and variable fraction of the outbreaks and cases that occur each year in the United States. Supporting this is the fact that 4 states reported a full 46% of all the outbreaks in 1982. Three of these, Colorado, Vermont, and Washington, received federal funds for surveillance in 1982 through contracts with EPA, and the fourth, Pennsylvania, has a well-developed surveillance system. Colorado received these federal funds for surveillance in both 1980 and 1981, and in those years reported an average of 7 outbreaks per year, in contrast to its previous average, reported in 1971-1979, of 2 outbreaks per year.

Water systems used on a seasonal basis such as those in camps, parks, and resorts have an abnormal demand placed upon them by large numbers of visitors during specific periods of the year and in some instances cannot meet such demands. For the most part these are noncommunity systems. Such water supply systems, especially those at campgrounds and parks, must be reevaluated and monitored, and corrections made to ensure the continued provision of safe water during periods of increased demand. The large outbreaks that occurred in 1975 in Crater Lake National Park (1) and Yellowstone National Park (2) underscore the problems related to water supplies that can occur in recreational areas.

In 1982, the number of outbreaks related to noncommunity systems was 55% of the number related to community systems. EPA estimates, however, that there are 20 million noncommunity, 180 million community, and 30 million individual water system users in the United States, so that the rate of illness was far greater among noncommunity system users than among community system users. Two pathogens followed recent trends in 1982. *G. lamblia* was the most frequently identified pathogen for the fifth consecutive year. It caused 30% of the outbreaks, the highest percentage since the present surveillance system began in 1971. Hepatitis A--from fecally contaminated wells--caused 3 outbreaks in 1982, 2 of which occurred in trailer parks.

Outbreaks caused by Norwalk agent were not reported in 1981, but accounted for 3 outbreaks in 1982. Fourfold rises in antibody titer to the Norwalk agent were found in at least 4 persons involved in each outbreak. The increase in identified Norwalk outbreaks in recent years probably represents, at least in part, an increasing awareness and diagnostic ability rather than a real increase. Although rotavirus was identified as the cause of 1 outbreak in 1981, it was not found in investigated outbreaks in 1982. It is possible that many acute gastrointestinal illnesses of unknown etiology (AGIs) represent undiagnosed Norwalk, rotavirus, and other viral disease outbreaks.

Two chemical outbreaks were recorded in 1982, caused by benzene and copper. The benzene-related outbreak was apparently caused by leakage into nearby private wells from a pit into which spillage from an exploded railway car had been diverted many years previous. The outbreak related to copper may have occurred after a drop in water line pressure allowed back siphonage of carbon dioxide and carbonated water from a soda machine into copper pipes. In another chemically caused outbreak, involving water but technically a foodborne outbreak, antimony was leached from an enamelware coffee pot in which acidic punch had been held for a prolonged period. Similarly, acidic punch left in metal containers that had galvanized metal linings with large areas of corrosion resulted in illness in 18 students in a home economics class (3).

Outbreaks caused by waterborne *Campylobacter* were reported in 1980 and 1981 (4), but not in 1982. However, 2 possible outbreaks of campylobacteriosis in Washington State were suspected, but not proven, to have been waterborne.

Two pathogens were identified as causes of U.S. waterborne outbreaks not reported in 1981. Tap water, used for soaking and rinsing bean sprouts eaten by patients, was shown to contain *Yersinia enterocolitica* which caused an outbreak in at least 15 persons in Pennsylvania. *Shigella sonnei* was isolated from mobile home park residents in West Virginia who were obtaining drinking water from an improperly protected well with pooled raw sewage within 25 feet of it.

In addition to 40 outbreaks related to drinking water systems, 4 outbreaks, involving 155 cases, were reported that resulted from contaminated water not meant for drinking (Table 5). Three resulted from swimming in untreated or inadequately treated surface waters. *Entamoeba* and *Giardia* were recovered from the stools of police and fire department divers working in polluted waters of the Hudson River. In an outbreak of *S. sonnei* gastroenteritis in Oklahoma, swimming in a local reservoir was significantly associated with increased risk of infection. In an outbreak related to a community swimming pool, 111 children who had used the pool had *Giardia* recovered from their stools. In an episode of diarrheal illness associated with non-potable water, power plant workers in Virginia were drinking water from an unlabeled tap which was delivering untreated water from the Potomac River. No bacterial pathogen was isolated from the stools of these workers, many of whom had recovered by the time of the investigation. As in the past (5), this probably represented an outbreak caused by multiple pathogens after an episode of "sewage poisoning."

Table 5 Waterborne Disease Outbreaks Not Related to Potable Water Systems, United States, 1982

State	Month	Etiology	Cases	Water Source	Location
NYC	July	<u>Giardia</u> , <u>Entamoeba</u>	12	river	city
OK	June	<u>Shigella sonnei</u>	49	reservoir	community
VA	June	AGI	16	river	power plant
WA	May	<u>Giardia</u>	78	swimming pool	community
Total			155		

F. References

1. Rosenberg ML, Koplan, JP, Wachsmuth IK, et al. Epidemic diarrhea at Crater Lake from enterotoxigenic Escherichia coli. Ann Intern Med 1977;86:714-8.
2. Center for Disease Control. Gastroenteritis--Yellowstone National Park, Wyoming. Morbidity and Mortality Weekly Rep 1977;26:283.
3. Centers for Disease Control. Illness associated with elevated levels of zinc in fruit punch--New Mexico. Morbidity and Mortality Weekly Rep 1983;32:257-8.
4. Taylor DN, Brown M, McDermott KT. Waterborne transmission of Camphylobacter enteritis. Microb Ecol 1982;8:347-54.
5. Center for Disease Control. Shigellosis and Salmonellosis--Morocco. Morbidity and Mortality Weekly Rep 1963;12:438-9.

G. Listing of Waterborne Outbreak Articles, 1982, from the Morbidity and Mortality Weekly Report

Centers for Disease Control. Community outbreak of Norwalk gastroenteritis--Georgia. Morbidity and Mortality Weekly Rep 1982;31:405-6.

H. Line Listing of Reported* Waterborne Outbreaks, United States, 1982

State	Month	Etiology†	Cases	Type of System‡	Deficiency§	Location of Outbreak	Source
AL	May	Norwalk	55	C	4	community	wells
AL	Sep	Benzene	16	I	5	community	wells
AK	Nov	AGI	35	C	2	community	well
AK	Jan	Copper	2	I	5	restaurant	soda machine
AZ	May	AGI	24	NC	2	truck stop	well
CA	Apr	Norwalk	25	C	3	reservation	storage tank
CA	Apr	Norwalk	170	C	4	USMC depot	broken main
CO	Jan	Giardia	10	C	3	ski resort	stream
CO	Feb	Giardia	17	C	3	ski resort	stream
CO	Mar	Giardia	4	C	3	ski resort	stream
CO	Apr	Giardia	8	C	5	ski resort	stream
CO	Jul	Giardia	72	C	3	family reunion	stream
CO	Aug	Giardia	28	NC	3	ranch resort	river
CO	Aug	AGI	36	C	4	trailer park	broken main
CO	Sep	Giardia	32	NC	1	ski resort	stream
GA	Jan	Norwalk	500	C	1	community	spring
GA	Jun	Hepatitis A	10	I	2	day-care center	well
GA	Jul	Hepatitis A	35	C	2	trailer park	well
IN	May	AGI	400	C	4	convention	reservoir
KY	Nov	Hepatitis A	58	C	2	community	spring
ME	Aug	AGI	25	C	3	trailer park	well
ME	Oct	AGI	50	I	2	hotel	well
NC	Sep	Shigella	153	NC	3	school	well
NV	Aug	Giardia	342	C	3,4	community	reservoir
NH	Oct	Giardia	13	C	3	community	lake
OR	Sep	Giardia	9	C	3	community	---
PA	Feb	Yersinia	16	I	2	home	well
PA	Apr	AGI	16	NC	3	---	well
PA	Jun	AGI	48	NC	3	country club	well
PA	Jul	AGI	71	NC	2	camp	well
PA	Jul	AGI	31	NC	2	camp	well
PR	Jun	AGI	500	NC	3,4	community	wells
TX	Sep	AGI	65	NC	1	campground	springs
VT	Oct	Giardia	22	C	2	community	springs
VT	July	AGI	105	C	1	recreation area	lake
VT	July	AGI	340	NC	1	camp	pond
VT	Feb	AGI	22	NC	3	subdivisions	well
VA	April	Giardia	4	I	2	home	well
WA	March	AGI	68	C	3	community	well
WV	July	Shigella	19	C	4	trailer park	well

* Please see section I.C. for discussion of reporting variables.

† (AGI) acute gastrointestinal illness of unknown etiology

‡ (C) community (municipal); (NC) non-community (semi-public); (I) individual

§ (1) untreated surface water (2) untreated ground water (3) treatment deficiencies (4) distribution system deficiencies (5) miscellaneous

I. Guidelines for Confirmation of Waterborne Disease Outbreaks

<u>Etiologic Agent</u>	<u>Clinical Syndrome</u>	<u>Epidemiologic Criteria</u>
<u>BACTERIAL</u>		
1. <u>Escherichia coli</u>	a) Incubation period: 6-36 hours b) Gastrointestinal syndrome: majority of cases have diarrhea	a) Demonstration of organisms of same serotype in epidemiologically incriminated water and stools of ill persons but not in stools of controls. -OR- b) Isolation of organisms of the same serotype which have been shown to be enterotoxigenic or invasive by special laboratory techniques from stools of most ill persons.
2. <u>Salmonella</u>	a) Incubation period: 6-48 hours b) Gastrointestinal syndrome: majority of cases have diarrhea	a) Isolation of <u>Salmonella</u> organism from epidemiologically implicated water. -OR- b) Isolation of <u>Salmonella</u> organism from stools or tissues of ill persons.
3. <u>Shigella</u>	a) Incubation period: 12-48 hours b) Gastrointestinal syndrome: majority of patients have diarrhea	a) Isolation of <u>Shigella</u> organism from epidemiologically implicated water. -OR- b) Isolation of <u>Shigella</u> organism from stools of ill persons.
4. <u>Campylobacter jejuni</u>	a) Incubation period: usually 2-5 days b) Gastrointestinal syndrome: majority of patients have diarrhea	a) Isolation of <u>Campylobacter</u> organisms from epidemiologically implicated water. -OR- b) Isolation of <u>Campylobacter</u> organisms from stools of ill persons
5. <u>Yersinia enterocolitica</u>	a) Incubation period: 3-7 days b) Gastrointestinal syndrome: majority of patients have diarrhea or cramps	a) Isolation of <u>Yersinia</u> organisms from epidemiologically implicated water. -OR- b) Isolation of <u>Yersinia</u> organisms from stools of ill persons. -OR- c) Significant rise in bacterial agglutinating antibodies in acute and early convalescent sera

<u>Etiologic Agent</u>	<u>Clinical Syndrome</u>	<u>Epidemiologic Criteria</u>
6. Others	Clinical and laboratory data appraised in individual circumstances	
<u>PARASITIC</u>		
1. <u>Giardia lamblia</u>	a) Incubation period: 1-4 weeks b) Gastrointestinal syndrome: chronic diarrhea, cramps, fatigue and weight loss	a) Demonstration of <u>Giardia</u> cysts in epidemiologically incriminated water. -OR- b) Demonstration of <u>Giardia</u> trophs or cysts in stools or duodenal aspirates of ill persons.
2. <u>Entameba histolytica</u>	a) Incubation period: usually 2-4 weeks b) Gastrointestinal syndrome: variable from acute fulminating dysentery with fever, chills, and bloody stools to mild abdominal discomfort with diarrhea	a) Demonstration of <u>Entamoeba histolytica</u> cysts in epidemiologically incriminated water. -OR- b) Demonstration of <u>Entamoeba histolytica</u> trophs or cysts in stools of affected persons.
3. Others	Clinical and laboratory data appraised in individual circumstances	
<u>CHEMICAL</u>		
1. Heavy metals Antimony Cadmium Copper Iron Tin, Zinc, etc.	a) Incubation period: 5 min. to 8 hours b) Clinical syndrome compatible with heavy metal poisoning--usually, gastrointestinal symptoms, often metallic taste (usually <1 hour)	Demonstration of high concentration of metallic ion in epidemiologically incriminated water.
2. Fluoride	a) Incubation period: usually <1 hour b) Gastrointestinal illness: usually nausea, vomiting, abdominal pain	Demonstration of high concentration of flouride ion in epidemiologically incriminated water.
3. Other chemicals	Clinical and laboratory data appraised in individual circumstances	

<u>Etiologic Agent</u>	<u>Clinical Syndrome</u>	<u>Epidemiologic Criteria</u>
<u>VIRAL</u>		
1. Hepatitis A	a) Incubation period: 14-28 days b) Clinical Syndrome: compatible with hepatitis symptoms, dark urine	Liver function tests compatible with hepatitis in affected persons who con- sumed the epidemiologically incriminated water
2. Norwalk and Norwalk-like	a) Incubation period: 24-48 hours (range 4-77 hours) b) Gastrointestinal syndrome: vomiting, watery diarrhea, abdominal cramps, often headache	a) Significant rise in anti- viral antibody in paired sera -OR- b) Demonstration of virus particles in stools of ill persons by immune- electron microscopy
3. Rotavirus	a) Incubation period: 24-72 hours b) Gastrointestinal syndrome: vomiting, watery diarrhea, abdominal cramps, often with significant dehydration	a) Demonstration of virus in the stools of ill persons by ELISA or electron microscopy or electron microscopy. -OR- b) Significant rise in antiviral antibody in paired sera.
4. Enterovirus	a) Incubation period: 5-10 days (range 3-15 days) b) Syndrome: Enteroviral gastroenteritis is uncommon, although it does occur. Enteroviral in- fection usually includes other syndromes; polio- myelitis, aseptic menin- gitis, herpangina, etc.	a) Isolation of virus from ill persons -OR- b) Isolation of virus from epidemiologically implicated water.
5. Others	Clinical and laboratory data appraised in indi- vidual circumstances	

Form Approved
OMB No. 0920-0004

1. Where did the outbreak occur?

2. Date of outbreak: (Date of onset of 1st case)

(1-2) City or Town _____ County _____

(3-8)

3. Indicate actual (e) numbers:

4. History of exposed persons:

5. Incubation period (hours):

Persons exposed _____ (9-11)
Persons ill _____ (12-14)
Hospitalized _____ (15-16)
Fatal cases _____ (17)

No histories obtained _____ (18-20)
No persons with symptoms _____ (21-23)
Nausea _____ (24-26) Diarrhea _____ (33-35)
Vomiting _____ (27-29) Fever _____ (36-38)
Cramps _____ (30-32)
Other, specify (39)

Shortest _____ (40-42) Longest _____ (43-45)
Median _____ (46-48)

Shortest _____ (49-51) Longest _____ (52-54)
Median _____ (55-57)

7. Epidemiologic data (e.g., attack rates [number ill/number exposed] for persons who did or did not eat or drink specific food items or waters, attack rates by quantity of water consumed, anecdotal information) * (58)

[illegible]

B. Vehicle responsible (item incriminated by epidemiologic evidence): (59-60)

9. Water supply characteristics

(A) Type of water supply** (61)

- ☐ Municipal or community supply (Name _____)
- ☐ Individual household supply
- ☐ Semi-public water supply
- ☐ Institution, school, church
- ☐ Camp, recreational area
- ☐ Other _____
- ☐ Bottled water

(B) Water source (check all applicable):

- ☐ Well
☐ Spring
☐ Lake, pond
☐ River, stream

(C) Treatment provided (circle treatment of each source checked in #):

- a b c d a. no treatment
- a b c d b. disinfection only
- a b c d c. purification plant - coagulation, settling, filtration,
- a b c d disinfection (circle those applicable)
- d other _____

10. Point where contamination occurred: (66)

- ☐ Raw water source ☐ Treatment plant ☐ Distribution system

*See CDC 52.13 (Formerly 4.245) investigation of a Foodborne Outbreak, Item 7.

5. **Semipublic water systems** are individual-type water supplies serving a group of residences or locations where the general public is likely to have access to drinking water. These locations include schools, camps, parks, resorts, hotels, industries, institutions, subdivisions, trailer parks, etc., that do not obtain water from a municipal water system but have developed and maintain their own water supply.

CDC 52.12 (F. 4. 461)
REV. 7-81

This report is authorized by law (Public Health Service Act, 42 USC 241).
While your response is voluntary, your cooperation is necessary for the understanding and control of the disease.

(Specify by "X" whether water examined was original (drunk at time of outbreak) or check-up (collected before or after outbreak occurred)

12. Treatment records: (Indicate method used to determine chlorine residual).

13. Specimens from patients examined (stool, vomitus, etc.) (68)

14. Unusual occurrence of events:

15. Factors contributing to outbreak (check all applicable):

- 16. Etiology: (69-70)**

17. Remarks: Briefly describe aspects of the investigation not covered above, such as unusual age or sex distribution; unusual circumstances leading to contamination of water; epidemic curve; control measures implemented; etc. (Attach additional page if necessary)

Name of reporting agency: (72)

Investigating Official: _____

Date of investigation:

Note: Epidemic and Laboratory assistance for the investigation of a waterborne outbreak is available upon request by the State Health Department to the Centers for Disease Control, Atlanta, Georgia 30333.

To improve national surveillance, please send a copy of this report to: Centers for Disease Control
Attn: Enteric Diseases Branch, Bacterial Diseases Division
Center for Infectious Diseases
Atlanta, Georgia 30333

Submitted copies should include as much information as possible, but the completion of every item is not required.

III. DISEASE OUTBREAKS RELATED TO RECREATIONAL WATER USE, 1982

A. Sources of Data

As with disease outbreaks associated with drinking water, the sources of data for outbreaks associated with recreational water use are the state epidemiologists and their staffs. However, reporting of these disease outbreaks is not systematic; therefore, the outbreaks reported here also represent a small fraction of the total number that occur. The likelihood of an outbreak coming to the attention of health authorities varies considerably from 1 locale to another, depending largely upon consumer awareness and physician interest. We have included in this section infections or intoxications related to recreational water, but have excluded wound infections caused by water-related organisms.

B. Comments

Twenty-seven outbreaks related to recreational use of water were reported to CDC in 1982 (Section C); this represents the largest number of such outbreaks reported since surveillance began in 1971. Of the 27 outbreaks, 25 were outbreaks of dermatitis, and there was 1 outbreak each of Pontiac fever (Legionella pneumophila) and adenoviral pharyngitis.

Twenty-four of the 25 dermatitis outbreaks were caused by Pseudomonas aeruginosa. This is the largest number of Pseudomonas dermatitis outbreaks reported to CDC since routine tabulation of outbreaks related to recreational water use began in 1978. Eight of these outbreaks in 1982 were identified in a survey of recreational water use dermatitis (personal communication: K Spitalny, Vt. Dept. of Health), and may have been diagnosed by the presence of pathognomonic pustular folliculitis after common use of a hot tub or whirlpool. The first such outbreak was reported in 1975 (6). This outbreak and the majority of outbreaks since have been related to whirlpool or hot tub use, although outbreaks related to swimming pool use have been reported (7). CDC recently published suggested health and safety guidelines for public spas and hot tubs (8). There are no known reports of outbreaks having occurred at facilities in which the pool water has been continuously maintained at pH 7.2-7.8 with free residual chlorine levels of at least 1.0 mg/L (9). The seventh dermatitis outbreak was a cluster of 7 persons with "swimmer's itch" in Alaska in 1982. This dermatitis, caused by schistosomal cercariae, usually occurs as a sporadic illness.

The Pontiac fever outbreak is the second such outbreak to be associated with whirlpool use. The first outbreak occurred in Vermont at a spa; Legionella was isolated from the whirlpool water. In 1982, a group using a health club's facilities in Michigan developed Pontiac fever (10), and L. pneumophila serogroup 6 was recovered from whirlpool water.

Fever and pharyngitis developed in children using a community swimming pool, and adenovirus 7A was recovered by throat culturing of 7 of them. Adenoviral disease associated with water use has not been reported in the last 2 years.

C. Line Listing of Disease Outbreaks Related to Recreational Water Use, 1982

State	Month	Illness	Cases	Etiology	Location	Source
AK	Oct	dermatitis	15	<u>Pseudomonas</u>	communities	mobile hot tub
AK	Aug	dermatitis	7	cercarial	lake	lake
FL	Feb	dermatitis	10	<u>Pseudomonas</u>	private res.	hot tub
IL	May	dermatitis	40	<u>Pseudomonas</u>	motel/hotel	whirlpool
IA	Jan	dermatitis	2	<u>Pseudomonas</u>	motel	whirlpool
KS	Jan	dermatitis	15	<u>Pseudomonas</u>	motel	hot tub
ME	Jan	dermatitis	8	<u>Pseudomonas</u>	motel	hot tub
MA	April	dermatitis	5	<u>Pseudomonas</u>	motor inn	hot tub
MA	April	dermatitis	32	<u>Pseudomonas</u>	conference at hotel	hot tub, sauna
MI	April	dermatitis	2	<u>Pseudomonas</u>	motel/hotel	-----
MI	May	Pontiac fever	14	<u>Legionella</u>	health club	whirlpool
MN	Jan	dermatitis	13	<u>Pseudomonas</u>	motel	hot tub
NN	April	dermatitis, otitis	26	<u>Pseudomonas</u>	motel/hotel	-----
MT	Jan	dermatitis	9	<u>Pseudomonas</u>	motel/hotel	-----
NM	Mar	dermatitis	61	<u>Pseudomonas</u>	health spa	hot tub
NY	May	dermatitis	117	<u>Pseudomonas</u>	resort	pool
NC	March	dermatitis, otitis	6	<u>Pseudomonas</u>	fraternity	rented hot tub
OH	March	dermatitis		<u>Pseudomonas</u>	motel	whirlpool
OK	July	fever, pharyngitis	66	adenovirus	community	swimming
PA	Jan	dermatitis	127	<u>Pseudomonas</u>	motel	whirlpool
PA	Oct	dermatitis	36	<u>Pseudomonas</u>	motel	whirlpool
PA	Dec	dermatitis	68	<u>Pseudomonas</u>	hotel	3 pools
PA	Dec	dermatitis	14	<u>Pseudomonas</u>	motel/hotel	pool
SD	Jan	dermatitis	13	<u>Pseudomonas</u>	motel	whirlpool
VT	Jan	dermatitis	7	<u>Pseudomonas</u>	motel	whirlpool
VA	Feb	dermatitis	12	<u>Pseudomonas</u>	club	whirlpool
WI	Jan	dermatitis	59	<u>Pseudomonas</u>	motel	whirlpool

D. References

6. McCausland WJ, Cox PJ. Pseudomonas infection traced to motel whirlpool. J Environ Health 1975;37:455-9.
7. Hopkins RS, Abbott DO, Wallace LE. Follicular dermatitis outbreak caused by Pseudomonas aeruginosa associated with a motel's indoor swimming pool. Pub Health Rep 1981;96:246-9.
8. Centers for Disease Control. Suggested health and safety guidelines for public spas and hot tubs. Atlanta: Centers for Disease Control, 1981 (HHS publication no. 99-960).
9. Centers for Disease Control. Outbreak of Pseudomonas aeruginosa serotype O:9 associated with a whirlpool. Morbidity and Mortality Weekly Rep 1981;30:329-31.
10. Remis RS, Jones EE, Iait KA, et al. An outbreak of Pontiac fever related to whirlpool use, Michigan, 1982. In: Program and Abstracts of the 83rd Annual Meeting of the American Society for Microbiology. Washington, D.C.: American Society for Microbiology, 1983 (Abstract C 359).

IV. OUTBREAKS OF ACUTE GASTROINTESTINAL DISEASE ON OCEAN-GOING VESSELS

A. Sources of Data

After shipboard outbreaks of typhoid fever (11), viral gastroenteritis, and shigellosis (12) occurred in 1971-1973, a review of ships' medical logs revealed an incidence of gastrointestinal illness on passenger cruise ships of 1% or less on 92% of cruises and 5% or greater on 2% of cruises (13). Shortly thereafter, the Bacterial Diseases Division and Quarantine Division, Bureau of Epidemiology, Center for Disease Control, established a surveillance system for shipboard gastrointestinal illness which required vessel masters to report all persons with diarrheal illness seen by the ship's physician as a part of his request for radio pratique (permission to enter a port). These reports are made by radio 4 to 24 hours before arrival in port and are logged by quarantine officers for forwarding to CDC monthly. In the event that 3% or more passengers on any 1 cruise visit the ship's physician with gastrointestinal illness, a quarantine officer will board and inspect the ship and then telephone a report to the Centers for Disease Control. Based on his report, the Enteric Diseases Branch, Division of Bacterial Diseases, Center for Infectious Diseases, may perform an in-depth investigation of the outbreak.

The Quarantine Division, Center for Prevention Services, performs a vessel sanitation inspection on each cruise ship semiannually or more frequently if indicated by poor sanitary ratings. Since the sanitation rating represents the results of an inspection carried out dockside on a given day, this rating may not reflect the sanitary conditions at sea. In 1978, however, results of the ships' reports of diarrheal illness since 1975 were compared with the vessel sanitation inspection reports for the same period. Outbreaks of diarrheal illness were significantly less frequent on vessels with sanitation scores that met the Public Health Service standards than on vessels which did not (14).

B. Comments

In 1982, CDC personnel investigated 3 outbreaks of diarrheal illness on cruise ships calling at U. S. ports. In the first outbreak, at least 31 passengers complained of diarrhea onboard a cruise ship traveling from Acapulco, Mexico, to Los Angeles, California; water was suspected as the vehicle, but neither a pathogen nor vehicle could be identified as the source of the outbreak. Similarly, acute gastroenteritis of unknown etiology occurred in 228 passengers on a cruise ship traveling from Southampton, United Kingdom; the outbreak was investigated in July while the vessel was berthed in New York City. In the third outbreak at least 247 passengers became ill after attending a buffet in Puerto Plata, Dominican Republic, in December. Shigella flexneri was recovered from the stools of 40 passengers.

C. References

11. Davies JW, Cox KC, Simon WR, et al. Typhoid at sea: Epidemic aboard an ocean liner. *Canad Med Assoc J* 1972;106:877-83.
12. Merson MH, Tenney JH, Meyers JD, et al. Shigellosis at sea: An outbreak aboard a passenger cruise ship. *Am J Epidemiol* 1975;101:165-75.
13. Merson MH, Hughes JM, Wood BT, Yashuk JC, Wells JC. Gastrointestinal illness on passenger cruise ships. *JAMA* 1975;231:723-7.
14. Dannenberg AL, Yashuk JC, Feldman RA. Gastrointestinal illness on passenger cruise ships, 1975-1978. *Am J Pub Hlth* 1982;72:484-8.

SCIENTIFIC REPORTS

Papers published in this section are reviewed by at least two qualified referees for accuracy, scientific soundness, experimental design, data analysis, and interpretation. Papers accepted may result from original research, critical literature reviews or well documented field investigations.

OCCUPATIONAL EXPOSURE TO TEMIK (ALDICARB) AS REPORTED BY CALIFORNIA PHYSICIANS FOR 1974-1976

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Temik 10G and Temik 15G are granular formulations of aldicarb, a carbamate insecticide. Temik 10G contains 10% aldicarb and Temik 15G contains 15% aldicarb. Temik has been commercially manufactured for more than seven years by the Union Carbide Corporation.

Temik is registered for use on cotton, potatoes, ornamentals and sugar beets in California; in 1976 there were 223,213 lb of Temik reported as applied primarily to cotton, sugar beets, potatoes and ornamentals. Temik is used to control insects, mites and nematodes as a systemic insecticide. Aldicarb is metabolized to aldicarb sulfoxide which has approximately the same toxicity as the parent compound. Aldicarb sulfoxide is the principal toxicant responsible for pest control in the plant. Continued oxidation in the plant results in aldicarb sulfone, a compound which is 25-fold less toxic to rats than either aldicarb or aldicarb sulfoxide. The half-life of aldicarb is about 3-4 weeks. Aldicarb sulfone is significantly more persistent. Enough of the toxic metabolites remain in the plant tissues to provide pest control for up to 8 weeks.

Due to high water solubility, the uptake of aldicarb from soil is rapid, with tissue residues reaching a maximum 10 to 14 days after application. This maximum is highly variable, depending on application rates, plant species and stage of development. The maximum residue may be up to 100 ppm in some ornamentals. This may be important because ornamentals are often handled during the period of maximum residue level. Debudding, pruning and tying are activities requiring significant worker contact with plant tissue.

Aldicarb is a cholinesterase-inhibiting insecticide. Technical aldicarb is the most toxic of the commonly used carbamate insecticides. The oral LD₅₀ for rats is 0.9 mg/kg. The dermal LD₅₀ for rabbits is about 5.0 mg/kg. Symptoms of poisoning are pinpoint pupils, tightness in the chest, sweating, nausea and salivation. Carbamates may produce the same signs and

symptoms in exposed persons as organophosphates, however, these effects are generally of shorter duration. Metabolism of aldicarb in birds and mammals is similar to metabolism in plants, only more rapid. Excretion of aldicarb metabolites is nearly complete within 1 day of ingestion. Aldicarb residues do not accumulate in the meat, milk or eggs of animals consuming feed from crops bearing no aldicarb residues at harvest.

MATERIALS AND METHODS

California is the only state which has a compulsory occupational injury reporting system. This provides the best available data in the United States on occupational exposures to pesticides. Besides the availability of medical reports there are reports of follow-up investigations of pesticide exposure incidents. For the period 1974 through 1976 there were 38 reports of occupational exposure to Temik that were reported by physicians and studied in this report.

Since Temik was first used in California, there has been one reported occupational fatality reported that involved Temik. This occurred in 1969, apparently as a result of exposure to Temik and Systox. A man had been working on several fields, some of which had been treated with Systox, an organophosphate insecticide. He became ill later that day and died enroute to the hospital. His blood cholinesterase level was depressed. The examining physician attributed the death to pesticide exposure. There were no reported fatalities in the 1974-1976 period that involved exposure to Temik.

RESULTS

During the period 1974-1976, there were 38 reports of occupational illness due to exposure to Temik. Each of the following cases was reported as possibly involving Temik. Subsequent investigations have indicated that Temik may not have been involved in every case.

1974 Temik Exposure Incidents.

In 1974, there were 10 Temik pesticide

exposure incidents reported. Of these, 8 involved employees who handled, loaded or applied Temik. The other 2 were exposed by contacting foliage or soil containing Temik residues. Nine of the incidents involved systemic illness while one resulted in skin irritation.

Suspected Systemic Illnesses

A greenhouse attendant was applying Temik 10G without wearing the required safety equipment. After finishing, he fell asleep. Upon awakening he experienced dizziness and was taken to a hospital. His employer was said to have discharged him because of failure to wear protective equipment as instructed.

A nursery employee complained of pain and nausea following application of Temik. The physician described his symptoms as being those of "organic phosphate exposure" and included constricted pupils, soft, painful abdomen and dry skin. Atropine was administered as an antidote and the patient was hospitalized.

A nursery worker, whose activities involved both pesticide application and sprinkler operation, became ill following application of Temik 10G to ornamentals with a hand-held, mechanical type spreader. The man wore a long-sleeved shirt, goggles, neoprene gloves and a respirator mask. Apparently, while doing his sprinkler work, the employee's clothes became wet. Temik granules contacting the clothing were then dissolved, allowing aldicarb to penetrate to his skin. After 4 hr of work, he became ill and was shortly thereafter admitted to a hospital where his case was diagnosed as being a case of Temik poisoning. He was hospitalized for 4 days and remained away from work for an unspecified amount of time.

A ground applicator of Temik 10G suffered nausea and headache. It is not known if he wore the protective clothing and respirator provided him. His pupils were not dilated. He was treated with atropine and released.

An employee who was loading Temik into hoppers on a tractor complained of illness whereupon a cholinesterase blood test was given. The results showed depressed cholinesterase levels. He was treated with atropine and released. The employee had not been wearing either goggles or a respirator. While dumping the granules into the hopper, it is believed that some dust arose and was inhaled by the employee.

A greenhouse attendant was applying Temik 10G without using mask, respirator or protective clothing. He became ill and was hospitalized for Temik poisoning.

Two ground applicators, in separate incidents, suffered mild systemic effects of Temik exposure. Symptoms were not given and it is not known if they were wearing protective clothing and equipment.

A man applying both fertilizer and Temik, and wearing mask, gloves and protective clothing, was said to have "inhaled the fumes" and became poisoned.

Skin Exposure Incidents

A greenhouse maintenance employee who was involved in cutting and thinning operations of ornamentals was reported to have had symptoms of neurodermatitis on both hands; Temik was the suggested cause. He was treated by a physician and released.

1975 Temik Exposure Incidents

In 1975, 15 pesticide exposure incidents were reported involving Temik. Of these cases, 10 were exposed directly to Temik granules, granules eroded partially to dust or dissolved granules. Five were exposed to residues of Temik on plants. Of the symptoms appearing as a result of exposure to Temik, 10 were of a systemic nature, 2 involved skin irritation, and 2 involved eye irritation. One unconfirmed case was reported resulting from exposure to Temik residue.

Suspected Systemic Illnesses

A nursery owner noticed Temik on some ornamentals which had just received treatment. He proceeded to wash off the plant with water. He was not wearing any protective footwear, so the dissolved granules washed off the foliage and exposed his feet to aldicarb. Nausea and dizziness resulted.

A ground applicator was applying Temik without using the protective clothing or equipment provided. As a result of inhalation of dust from the granules, the employee became nauseated and was then treated by a physician.

While loading a hand-held mechanical applicator, a nursery worker broke and spilled a bag of Temik 10G. He then cleaned up the granules with his hands. The employee was not wearing gloves and he became ill soon afterward. He went home feeling sleepy and did not inform his supervisor of his exposure. The symptoms included headaches, dizziness and abdominal pain. He went to a physician for treatment. The employer stated that he had ordered the employee to wear gloves but he had disobeyed.

A nursery worker employed as a "florist cultivator" in a greenhouse became ill after applying Temik 10G. Atropine was administered by a physician and recovery followed.

A nursery worker who worked in a greenhouse became nauseated after he inhaled the dust from Temik granules. From the symptoms seen, the physician ascribed the illness to Temik.

Negligence in the wearing of a respirator was blamed in the illness of a nursery worker. The employee applied Benlate and diazinon for 2 days and Temik for 1 day. It was noted by his fellow employees several times during the applications that he was not wear-

ing the respirator provided. The illness may have been the result of combined exposure to diazinon and Temik.

A nursery worker applying Temik by hand to roses became ill a few hours after application. Apparently, he had felt uncomfortable with his gloves on, so had taken them off. Continuing to make application by hand resulted in exposure, illness and subsequently hospitalization of the employee for three days.

A nursery worker was spreading Temik in a greenhouse. The only protective equipment used were goggles; long-sleeved shirts and gloves had also been specified to provide for safety. The Temik apparently contacted the employee's hands and arms to cause the "toxic reaction" reported by his physician.

A laborer was applying Temik when he became nauseated. He was wearing gloves and a respirator, but reported smelling the pesticide. The physician diagnosed pesticide poisoning, but blood cholinesterase tests were negative. No work time was lost.

Skin Exposure Incidents

A woman working with nursery stock which had been treated with Temik suffered contact dermatitis on the face and hands. The company had a policy of not allowing employees to handle treated plants for 5 days after application.

An indoor worker at a large department store was preparing ornamentals for sale when her hands broke out with swelling and blisters. The plants had been treated with Temik at least 4 weeks previously. She had skin contact with both plant and soil. It is possible this incident was not caused by Temik.

Eye Exposure Incidents

A nursery worker suffered eye irritation when dust from Temik granules contacted his eyes. It was thought that the fans in the greenhouse in which he was working may have blown aldicarb into his eyes. The employee's physician reported the man was suffering from chemical conjunctivitis.

A laborer was distributing Temik granules when some flew into his eyes. He was not wearing the goggles that had been supplied. He was treated for chemical conjunctivitis and released.

Unconfirmed Incident

In a case in which the employee involved denied exposure to Temik, a nursery worker received skin irritation from plants which had been previously treated with Temik. The physician reported the irritation as being contact dermatitis.

1976 Temik Exposure Incidents

In 1976, 13 incidents of exposure to Temik were reported by physicians to the California Department of Food and Agriculture. Six of these were a result of loading, applying or handling Temik and 7 were from exposure to Temik residues. Twelve of the 13 exposures resulted in systemic illness and 1 skin irritation.

Suspected Systemic Illnesses

A nursery worker became ill while cleaning plants when he came in contact with Temik granules in the pots. Symptoms were not described by the physician. The employee remained off of work for 2 days.

A greenhouse worker who apparently was not wearing protective equipment properly was opening and emptying bags of Temik. While doing so he accidentally got a few granules in his mouth. The physician stated that the employee had symptoms like organophosphate poisoning and treated him accordingly.

An employee was instructed to enter a post-ed greenhouse. One hour later, she began feeling ill and eventually went to a hospital emergency room. She was told by other employees that Temik and Endrin were used, but the employer stated that only Kelthane had been used. She was treated and released. The exact cause of this illness remains unknown.

A woman became ill while working with plants that had been treated with Temik. The foliage was wet due to watering and apparently some granules were still on the foliage. When the employee contacted the plants, some of the partially dissolved granules apparently stuck to her skin and hair. It is possible that she swallowed one. She was treated and promptly recovered.

A nursery worker became ill while he was inspecting indoor plants which had been indiscriminately broadcast with Temik. He placed his hand in a pot which was standing overhead and knocked a granule of Temik into his mouth. The manner of application was said not to have been authorized by the management. The exposed employee was not wearing any safety equipment.

A man was driving a tractor applying Temik to roses when he was exposed to dust from the granules. He suffered weakness, nausea and vomiting. While turning the tractor the wind apparently blew dust from the Temik granules into the operator's face. He was said to have been wearing all protective equipment while loading the Temik, but it is not known if he was wearing it while applying. The employee's plasma cholinesterase was tested the day of exposure and reported as normal when the test was run.

A man applying Temik to ornamentals in a nursery experienced cholinesterase depression and associated symptomatic effects. He wore all specified protective equipment but he said the skin between his glove and sleeve was exposed. The employee, who had been informed as to the potential hazards of use of cholinesterase inhibiting pesticides, recognized his own symptoms. He then obtained a product label before seeking a physician.

A tractor driver was admitted to a hospital with symptoms of nausea, vomiting and constricted pupils. The employee was said to have been loading and applying Temik without respirator, gloves or protective clothing.

A nursery worker loaded Temik for use in a tractor without wearing recommended safety equipment (gloves and respirator). Blood cholinesterase was depressed and the employee was said to have had "headaches and trouble breathing."

Two nursery workers entered and worked in a greenhouse recently treated with Temik. The greenhouse was open and unposted. Contact with the treated ornamentals resulted in stomach cramps, headache, vomiting, diarrhea and tremors. The workers were treated with atropine and admitted to the hospital for 5 days.

After applying Temik for 3 days in a cotton field, a ground applicator experienced gastroenteritis with excessive salivation, blurred vision and dizziness. He was said to have been wearing the appropriate safety equipment. He was taken to a hospital emergency room, treated and released.

Skin Exposure Incident

A nursery worker had been working with plants that had been treated with Temik 7 days earlier. He also had aided in the application of Cygon 2 days earlier and developed a facial skin irritation. He saw a physician who diagnosed the injury as contact dermatitis. The exact cause was uncertain but the physician suggested pesticide exposure.

DISCUSSION

Aldicarb is an extremely toxic n-methyl carbamate that is also an effective pesticide. It is also toxic to man and animals by the oral, dermal and inhalation routes. Were it formulated as a liquid or a dust, there is little doubt that large numbers of serious human exposures would occur. Mevinphos (Phosdrin) has similar toxicity ratings, and liquid and dust formulations of this product result in large numbers of poisonings. It was a valid formulation and registration decision to only formulate and register low concentrations of aldicarb in the granule form. There is only a minor problem with the presently available granules; with shipment and handling, there is some tendency for the surfaces to dust-off resulting in small amounts of toxic dust in the containers that present some safety hazards. There is also some problem when the granules get wet and any skin contact with them occurs. Considering the large number of pounds of Temik used and the small number of human cases which occurred, it would appear that currently available formulations are acceptably safe when handled carefully.

Information to physicians on the Temik label, and a number of the labels of n-methyl carbamate pesticides approved by the Environmental Protection Agency, list atropine sulfate as the specific antidote and either make no comment on the use of oximes in therapy or specifically state that their

use is contraindicated because the toxicity is increased for mammals poisoned by this one carbamate. One of the best summaries on this subject is by I.L. Nafoff and B. Beiff: "Effects of Oximes on the Acute Toxicity of Anticholinesterase Carbamates," *Toxicology and Applied Pharmacology*, 25, pages 569-573, 1973. They point out that experimental animal studies with oximes and several carbamates show that toxic effects are enhanced only with carbaryl. In the other carbamate poisonings, oximes given alone or in combination with atropine sulfate, caused no increase in toxicity, and in some cases there was a significant therapeutic benefit from the oximes. With Temik poisoning in male rats, the sc median lethal dose ($\mu\text{M/kg}$) was as follows: no treatment, 3.5; obidoxime only, 8.2; P21 oxime only, 5.4; atropine sulfate, 18.0; atropine and obidoxime, 24.0; atropine and P21, 22.4. It appears that the use of oximes, with the exception of carbaryl, are not contraindicated in the treatment of n-methyl carbamate poisoning. Oximes have definite therapeutic benefits in treating Temik poisonings.

Employees of pest control firms in California commonly work with several organophosphates and carbamates each day. If they become poisoned, it is usually with organophosphates, but the workers have been exposed to both. If the physician follows the instructions on the organophosphate and carbamate labels, or the literature that accompanies the oximes, oximes will not be given. This is a serious problem when the patient has been poisoned with an organophosphate and could benefit from the use of oximes. Physicians aware of the newer literature or who have a patient poisoned with an organophosphate will usually proceed with oxime treatment as soon as exposure to carbaryl in the previous 24 hours is ruled out.

SUMMARY

In the years 1974 through 1976 there were 38 illnesses and injuries in California due to occupational exposure to Temik reported by physicians. Thirty-one of the 38 incidents resulted in systemic illness, 4 in skin injuries and 2 in eye irritation. Although some of the persons who developed systemic illness became quite ill, treatment was effective and illnesses were usually of short duration. The formulation of Temik only as granules apparently has been a major factor in preventing illnesses from occupational exposure. The active ingredient in Temik, aldicarb, is one of the most toxic chemical ingredients used in pesticides today. Liquid formulations of pesticides equally toxic have proven to be extremely hazardous because entry into the body may result when a small amount is splashed on the skin or when vapors are inhaled. Pesticides equally toxic and formulated as dusts are also extremely hazardous because the dust may be inhaled or settle on a worker's skin.

John Skinner

Additional Questions For The Record of the November 29, 1983
Hearing on Groundwater Contamination

Question

Would you provide for the record a description of each instance in which your office has requested that the Office of Toxic Substances use the authorities of TSCA to obtain test data about specific chemicals of concern to your program?

Answer

While the Office of Solid Waste has never specifically used the authorities of the Toxic Substances Control Act to obtain test data about specific chemicals, we have often used data and toxicity evaluations performed under TSCA in the course of developing RCRA waste listing documents. For example, we routinely use their extensive data base to identify facilities that may be generating specific potentially hazardous wastes and individual chemicals that need to be studied or regulated under RCRA.

Question

Provide a breakdown of the number of surface impoundments at National Priority Sites which are affecting water supplies. (p. 75-76)

Answer

See attached charts. (page 1 of 5)

NATIONAL PRIORITIES LIST SITES WITH SURFACE IMPROVEMENTS, POND, PITS, OR LAGOONS
JANUARY 29, 1984

RG	ST	FACILITY NAME	CITY/COUNTY	NPL STATUS	OBSERVED RELEASED TO	WATER USED AS DN SUPPLY	DN SUPPLY CONTAMINATED
01	CT	SOLVENTS RECOVERY SERVICE	SOUTHTON	FINAL	GW SM	GW	YES
01	CT	YAMASKI WASTE LAGOON	CANTERBURY	FINAL	GW SM	GW	YES
01	MA	BAIRD & MCGUIRE	HOLBROOK	FINAL	GW SM	GW SM	YES
01	MA	INDUSTRI-PLER	WILBURN	FINAL	GW SM	GW	YES
01	MA	IRON WORKS PARK	BELLERITA	PROPOSED	GW SM	GW	YES
01	MA	RESERVE INC.	DARTMOUTH	FINAL	GW SM	GW	YES
01	MA	W. R. GRACE CO. (ACTION PLANT)	ACTON	FINAL	GW SM	GW	YES
01	ME	MCKIN CO.	GRAY	FINAL	GW SM	GW SM	YES
01	ME	O'CONNOR	AUGUSTA	FINAL	GW SM	GW	YES
01	NH	AUBURN ROAD LANDFILL	LONDONDERRY	FINAL	GW SM	GW	YES
01	NH	KES - EPPING	EPPING	FINAL	GW SM	GW	YES
01	RI	DAVIS LIQUID WASTE	SMITHFIELD	FINAL	GW SM	GW	YES
01	RI	WESTERN SAND & GRAVEL	BURRILLVILLE	FINAL	GW SM	GW	YES
02	NJ	A. O. POLYMER	SPARTA TOWNSHIP	FINAL	GW SM	GW	YES
02	NJ	AMERICAN CYANAMID CO.	BOUND BROOK	FINAL	GW SM	GW SM	YES
02	NJ	BRICK TOWNSHIP LANDFILL	BRICK	FINAL	GW SM	GW	YES
02	NJ	BRIDGEPORT RENTAL & OIL	BRIDGEPORT	FINAL	GW SM	GW	YES
02	NJ	BURNT FLY BOG	MARLBORO TOWNSHIP	FINAL	GW SM	GW SM	YES
02	NJ	CALDWELL TRUCKING CO.	FAIRFIELD	PROPOSED	GW SM	GW	YES
02	NJ	CHEMICAL LEANAN TANK LINERS, INC.	BRIDGEPORT	FINAL	GW SM	GW	YES
02	NJ	KIN-BUC LANDFILL	EDISON TOWNSHIP	FINAL	GW SM	GW	YES
02	NJ	LIPART LANDFILL	PITMAN	FINAL	GW SM	GW	YES
02	NJ	CLIFFSIDE LANDFILL	FREEHOLD TOWNSHIP	FINAL	GW SM	GW	YES
02	NJ	SHIELDALLOY CORP.	PLUMSTEAD TOWNSHIP	PROPOSED	GW SM	GW	YES
02	NJ	SYNCOM RESINS	WILMINGTON TOWNSHIP	FINAL	GW SM	GW	YES
02	NJ	UNIVERSAL OIL PRODUCTS (CHEM. DIV.)	SOUTH LEBANON	FINAL	GW SM	GW	YES
02	NJ	W. R. GRACE CO. (MAYNE PLANT)	EAST RUTHERFORD	FINAL	GW SM	GW	YES
02	NJ	WILSON FARM	WAYNE TOWNSHIP	PROPOSED	GW SM	GW	YES
02	NY	FACET ENTERPRISES, INC.	ELMIRA	FINAL	SM	GW	YES
02	NY	GE MOREAU	SOUTH GLENS FALLS	FINAL	GW SM	GW SM	YES
02	NY	GENERAL MOTORS-CENT. FOUNDRY DIV.	MASSENA	PROPOSED	GW SM	GW	YES
02	NY	MARATHON BATTERY CORP.	COLD SPRINGS	FINAL	GW SM	GW	YES
02	NY	STICKLEBERRY REFINERY	WELLSVILLE	FINAL	GW SM	GW	YES
02	NY	YORK OIL CO.	MOIRA	FINAL	GW SM	GW	YES
02	PR	FRONTIERA CREEK	RIO ARAJO	FINAL	SM	GW	YES
03	DE	DELAWARE CITY PVC PLANT	DELAWARE CITY	FINAL	GW SM	GW	YES
03	DE	OLD BRINE SLUDGE LANDFILL	DELAWARE CITY	PROPOSED	GW SM	GW	YES

NATIONAL PRIORITIES LIST SITES WITH SURFACE ENCLOSURES, POND, PITS, OR LAGOONS
JANUARY 25, 1987

RG	ST	FACILITY NAME	CITY/COUNTY	HPI STATUS	OBSERVED RELEASED TO	WATER USED AS DW SUPPLY	DW SUPPLY CONTAMINATED
03	MD	SAND, GRAVEL AND TONE	ELKTON	FINAL	GM SM	GM	
03	PA	BRUIN LAGOON	BRUIN BOROUGH	FINAL	GM SM	GM SM	YES
03	PA	CENTRE COUNTY REPOSE	STATE COLLEGE BOROUGH	FINAL	GM SM	GM	YES
03	PA	CRAIG FARM DRUM	PARKER	FINAL	GM SM	GM	YES
03	PA	DOUGLASSVILLE DISPOSAL	DOUGLASSVILLE	FINAL	GM SM	GM	YES
03	PA	DOUGLASSVILLE DISPOSAL	DOUGLASSVILLE	FINAL	GM SM	GM	YES
03	PA	HIMICA LANDFILL	OKER HAVEN	FINAL	GM SM	GM	YES
03	PA	KIMBERTON	OKER HAVEN	FINAL	GM SM	GM	YES
03	PA	LACKAWANNA REFUSE	OKER HAVEN	FINAL	GM SM	GM	YES
03	PA	MILL CREEK DUMP	OKER HAVEN	FINAL	GM SM	GM	YES
03	PA	RESIN DISPOSAL	OKER HAVEN	FINAL	GM SM	GM	YES
03	PA	TYSONS DUMP	OKER HAVEN	FINAL	GM SM	GM	YES
03	PA	WESTLINE	OKER HAVEN	FINAL	GM SM	GM	YES
03	VA	U. S. TITANIUM	WESTLINE	FINAL	GM SM	GM	YES
03	WV	FIRE CHEMICAL, INC.	PINEY RIVER	FINAL	GM SM	C 1	
03	WV	WEST VIRGINIA ORDINANCE	NITRO	FINAL	GM SM	GM	
04	FL	ALPHA CHEMICAL CORP.	GALLOWAY	FINAL	GM SM	GM	YES
04	FL	AMERICAN CREOSOTE WORKS	PENSACOLA	FINAL	GM SM	GM	YES
04	FL	BROWN WOOD PRESERVING	LIVE OAK	FINAL	GM SM	GM	YES
04	FL	CABOT-KOPPERS	GAINESVILLE	FINAL	GM SM	GM	YES
04	FL	COLEMAN EVANS WOOD PRESERVING CO.	WHITENHOUSE	FINAL	GM SM	GM	YES
04	FL	DAVIE SANDFILL	DAVIE	FINAL	GM SM	GM	YES
04	FL	MIAMI DRUM SERVICES	MIAMI	FINAL	GM SM	GM	YES
04	FL	PIONEER SAND CO.	MARTIN	FINAL	GM SM	GM	YES
04	FL	REYES GALVANIZING CORP.	TAMPA	FINAL	GM SM	GM	YES
04	FL	SCHWABER GALVANIZING CORP.	COTTONDALE	FINAL	GM SM	GM	YES
04	FL	SCHWABER GALVANIZING CORP.	COTTONDALE	FINAL	GM SM	GM	YES
04	FL	TONER CHEMICAL CO.	CLEMONS	FINAL	GM SM	GM	YES
04	FL	WHITEHOUSE OIL PILLS	WHITEHOUSE	FINAL	GM SM	GM	YES
04	FL	ZELLWOOD GROUNDWATER CONTAM	ZELLWOOD	FINAL	GM SM	GM	YES
04	GA	CLIN CORP. (AREAS 1 & 2 & 3)	AUGUSTA	PROPOSED	GM	GM	
04	NY	LEE'S LANE LANDFILL	LOUISVILLE	FINAL	GM	GM	
04	NC	CHENTRONICS, INC.	SHANNANDA	FINAL	GM SM	GM	
04	SC	CAROLANN, INC.	FORT LAWN	FINAL	GM SM	GM	
04	SC	GEIGER (GSM OIL)	RAMBOULES	PROPOSED	GM SM	GM	
04	SC	INDEPENDENT MILL CO.	RAMBOULES	PROPOSED	GM SM	GM	
04	SC	KALANA SPECIALTY CHEMICALS	BEAUFORT	PROPOSED	GM SM	GM	
04	SC	KOPPERS CO., INC. (FLORENCE PLANT)	FLORENCE	PROPOSED	GM SM	GM	
04	SC	SCRI BLUFF ROAD	COLUMBIA	FINAL	GM SM	GM	YES
04	SC	MANCHESTER, INC.	BURTON	PROPOSED	GM SM	GM	

NATIONAL PRIORITIES LIST SITES WITH SURFACE IMPROVEMENTS, POND, PITS, OR LANDFILL
JANUARY 25, 1984

RG	ST	FACILITY NAME	CITY/COUNTY	NPL STATUS	OBSERVED RELEASED TO	WATER USED AS DM SUPPLY	DM SUPPLY CONTAMINATED
ON	TN	GALLAWAY PITS	GALLAWAY	FINAL	GM SM	GM	
05	IL	A C F MATERIALS	GREENUP	FINAL	GM SM	GM	YES
05	IL	CROSS BROS/PENBROKE	PENBROKE TOWNSHIP	FINAL	GM SM	GM	YES
05	IL	GALESBURG ROPPERS	GALESBURG	FINAL	GM SM	GM	
05	IL	VELSICIL ILLINOIS	MARSHALL	FINAL	GM SM	GM	
05	IN	ENVIROCHEM	ZIONSVILLE	FINAL	GM SM	GM	YES
05	IN	REILLY T & CHEMICAL CORP.	INDIANAPOLIS	PROPOSED	GM SM	GM	
05	IN	SEYMOUR RECYCLING CORP.	SEYMOUR	FINAL	GM SM	GM	YES
05	MI	AUTO ION CHEMICALS, INC.	KALAMAZOO	FINAL	GM SM	GM	
05	MI	BEALIN & FARRO	SWAN CREEK	FINAL	GM SM	GM	YES
05	MI	BURROWS SANITATION	HARTFORD	PROPOSED	GM SM	GM	
05	MI	CLIFF/DOW DUMP	MARQUETTE	FINAL	GM SM	GM	
05	MI	FOREST WASTE PRODUCTS	OTISVILLE	FINAL	GM SM	GM	
05	MI	GM LANDFILL	OTISVILLE	FINAL	GM SM	GM	
05	MI	GRAND TRAVERSE OVERALL SUPPLY CO.	GREILICKVILLE	FINAL	GM SM	GM	YES
05	MI	LIQUID DISPOSAL INC.	UTICA	FINAL	GM SM	GM	
05	MI	PACKAGING CORP. OF AMERICA	GRANDVILLE	FINAL	GM SM	GM	YES
05	MI	PACKAGING CORP. OF AMERICA	DALTON TOWNSHIP	FINAL	GM SM	GM	YES
05	MI	PACKAGING CORP. OF AMERICA	FILER CITY	FINAL	GM SM	GM	YES
05	MI	TAR LAKE	HOWELL	FINAL	GM SM	GM	YES
05	MI	WASH KING LAUNDRY	MARCELONA TOWNSHIP	FINAL	GM SM	GM	YES
05	MN	ARROWHEAD REFINERY CO.	PLEASANT PLAINS TWP	FINAL	GM SM	GM	YES
05	MN	BOISE CASCADE/DAN/NEOTRONICS	HERMANTON	PROPOSED	GM SM	GM	YES
05	MN	BURLINGTON NORTHERN	PRIDLEY	FINAL	GM SM	GM	YES
05	MN	JOSLYN MFG. & SUPPLY CO.	BRAINE/BARTER	FINAL	GM SM	GM	YES
05	MN	MCGILLIS & GIBBS/BELT & POLE	BROOKLYN CENTER	PROPOSED	GM SM	GM	YES
05	MN	MONTGOMERY TRUCK & CASTER CO.	NEW BRIGHTON	PROPOSED	GM SM	GM	YES
05	MN	REILLY TRUCK & CASTER CO.	FARI BAULT	PROPOSED	GM SM	GM	YES
05	MN	ST. LOUIS RIVER	ST. LOUIS PARK	FINAL	GM SM	GM	YES
05	MN	ST. REGIS PAPER CO.	ST. LOUIS COUNTY	PROPOSED	GM SM	GM	YES
05	MN	WHITTAKER CORP.	CASS LAKE	PROPOSED	GM SM	GM	YES
05	OH	ALLIED CHEMICAL & IRONTON CORE	MINNEAPOLIS	PROPOSED	GM SM	GM	YES
05	OH	CHEM-DYNE	IRONTON	FINAL	GM SM	GM	YES
05	OH	FIELDS BROOK	HOWELL	FINAL	GM SM	GM	
05	OH	LASKIN/POPULAR OIL CO.	ASHLAND	FINAL	GM SM	GM	
05	OH	MIAMI COUNTY INCINERATOR	JEFFERSON TOWNSHIP	FINAL	GM SM	GM	
05	OH	MAISTINE, INC.	TROY	PROPOSED	GM SM	GM	YES
05	OH	SOUTH POINT PLANT	READING	PROPOSED	GM SM	GM	
05	MI	MID-STATE DISPOSAL, INC./LANUFILL	SOUTH POINT	PROPOSED	GM SM	GM	YES
05	MI	WHEELER PIT	CLEVELAND TOWNSHIP	PROPOSED	GM SM	GM	YES
05	MI	WHEELER PIT	LA PRAIRIE TOWNSHIP	PROPOSED	GM SM	GM	

NATIONAL PRIORITIES LIST SITES WITH SURFACE MONUMENTS, PUMPS, PITS, OR LADINGS
JANUARY 2, 1986

RG	ST	FACILITY NAME	CITY/COUNTY	HPL STATUS	OBSERVED RELEASED TO	WATER USED AS DM SUPPLY	DM SUPPLY CONTAMINATED
06	AR	FRIT INDUSTRIES	WALNUT RIDGE	FINAL	SM	GM	
06	AR	GURLEY PIT	EDMONDSON	FINAL	SM	GM	
06	AR	INDUSTRIAL WASTE CONTROL	FT. SMITH	FINAL	GM	GM	
06	AR	MID-SOUTH ROPE PRODUCTS	MEHA	FINAL	GM	GM	YES
06	LA	BAYOU SORREL	DAYOU SORREL	PROPOSED	GM	GM	
06	LA	CLEVE REBER	SCOTLANDVILLE	PROPOSED	SM	GM	
06	LA	PETRO-PROCESSORS	SCOTLANDVILLE	PROPOSED	SM	GM	
06	NM	AT & SF / CLOVIS	CLOVIS	FINAL	GM	GM	YES
06	NM	HOMESTEAK MINING CO.	MILAN	FINAL	GM	GM	YES
06	NM	UNITED NUCLEAR CORP.	CHURCH ROCK	FINAL	GM	GM	YES
06	OK	COMPASS INDUSTRIES	TULSA	PROPOSED	SM	GM	
06	OK	MADAGE/CATNER	CRINER	FINAL	GM	GM	
06	OK	SAND SPRINGS PETROCHEMICAL CO.	SAND SPRINGS	PROPOSED	GM	GM	
06	TX	BIO-ECOLOGY SYSTEMS, INC.	GRAND PRAIRIE	FINAL	GM	GM	
06	TX	PERMCO	CROSBY	FINAL	GM	GM	
06	TX	GENERAL INDUSTRIES (FURHRMAN)	HIOUSTON	PROPOSED	GM	GM	
06	TX	HIGHLANDS ACID PIT	HIGHLANDS	FINAL	GM	GM	YES
06	TX	NOTCO	NEW HAVEN	FINAL	GM	GM	
06	TX	PIG ROAD	NEW HAVEN	PROPOSED	GM	GM	
06	TX	SITES DISPOSAL PITS	CROSBY	FINAL	GM	GM	
06	TX	UNITED CREOSOTING CO.	CROSBY	PROPOSED	GM	GM	YES
07	IA	INDEX CORP.	COUNCIL BLUFFS	FINAL	GM	GM	
07	KS	ARKANSAS CITY DUMP	ARKANSAS CITY	FINAL	GM	GM	
07	KS	JOHN'S SLUDGE POND	MICHITA	FINAL	GM	GM	
07	MO	ELLI SVILLE SITE	ELLI SVILLE	FINAL	GM	GM	
08	CO	JRODERICK WOOD PRODUCTS	DENVER	PROPOSED	GM	GM	YES
08	CO	LINCOLN PARK	CARON CITY	PROPOSED	GM	GM	
08	MT	ANACONDA SHELTER - ANACONDA	ANACONDA	FINAL	GM	GM	
08	MT	E. HELENA SITE	EAST HELENA	PROPOSED	GM	GM	
08	WY	BAXTER/UNION PACIFIC TIE TREATING	LARAMIE	FINAL	GM	GM	
09	AZ	INDIAN BEND WASH AREA	SCOTTSDALE	FINAL	GM	GM	YES
09	AZ	LITCHFIELD AIRPORT AREA	GOODYEAR/AVONDALE	FINAL	GM	GM	YES

NATIONAL PRIORITIES LIST SITES WITH SURFACE IMPEDIMENTS, POND, PIT, OR LAGOONS
JANUARY 25, 1974

RG	ST	FACILITY NAME	CITY/COUNTY	NPL STATUS	OBSERVED TO RELEASED TO	WATER USED AS DW SUPPLY	DW SUPPLY CONTAMINATED
09	AZ	TUCSON INT'L AIRPORT	TUCSON	FINAL	GM	GM	YES
09	CA	IRON MOUNTAIN MINE	REDDING	FINAL	GM	GM	SM
09	CA	JEBBOON JUNKYARD	SACRAMENTO	FINAL	GM	GM	SM
09	CA	KOPPERS CO., INC. (LOBOVILLE PLANT)	OROVILLE	PROPOSED	GM	GM	SM
09	CA	LOUISIANA CO. OF OIL CORP.	RICHMOND	FINAL	GM	GM	SM
09	CA	MAC MARES	CLOVERDALE	FINAL	GM	GM	SM
09	CA	PURITY OIL SALES, INC.	MALAGA	FINAL	GM	GM	SM
09	CA	SELMA TREATING CO.	SELMA	FINAL	GM	GM	SM
09	CA	STRINGFELLOW	GLEN AVOON HEIGHTS	FINAL	GM	GM	SM
10	TO	BUNKER HILL MINING	SHELTERVILLE	FINAL	GM	SM	
10	OR	GODLO, INC.	PORTLAND	FINAL	GM	SM	
10	OR	TELETYPE MAN CHANG	ALBANY	FINAL	GM	SM	GM
10	OR	UNITED CHROME PRODUCTS, INC.	CORVALLIS	PROPOSED	SM	SM	SM
10	WA	QUEEN CITY FARMS	NAPLE VALLEY	PROPOSED	SM	SM	YES
10	WA	WESTERN PROCESSING CO., INC.	KENT	FINAL	SM	SM	YES

TOTAL SITES LISTED: 167

Additional Question For The Record of the November 29 Hearing
on Groundwater Contamination

Dr. John Moore

Question: How many of the Toxic drinking water contaminants mentioned in the 1981 CEQ study are the subject of TSCA Section 4 test rules and negotiated testing agreements? (pg. 93-94)

Answer: The report indentified 10 chemicals that are the subject of TSCA Section 4 actions. They are:

1,1,1-Trichloroethane
Xylene
Toluene
Methylene Chloride
Bis (2-ethylhexyl) phthalate
~~Di-n-butylphthalate~~
Ethylbenzene
Diethyl phthalate
Butyl benzyl phthalate
Chloromethane

Jack Ravan

Additional Question For The Record of the November 29, 1983
Hearing on Groundwater Contamination

QUESTION

Respond to Senator Durenberger's question about the existence of any mechanisms in the Clean Water Act to regulate leaking underground storage tanks, and what changes in the law might be helpful in that regard.

ANSWER

EPA recently reviewed the applicability of various environmental statutes for control of leaking underground storage tanks. Applicability of sections 311 and 301 of the Clean Water Act to leaking storage tanks is described in attachment I. The Agency currently has no plans to seek changes to the Clean Water Act in order to address leaking underground storage tanks.

National Primary Drinking Water Regulations or may otherwise adversely affect the health of persons. This mandate could be met by a wide variety of preventive measures (e.g., tank design, monitoring).

Actions Required:

1. The Agency would need to promulgate rules under Section 1421 of the SDWA establishing preventive measures for underground storage tanks.

2. EPA (or a state with primacy) would also need to issue permits to implement these standards.

E. Section 311 of the Clean Water Act (CWA)

Section 311 of the Clean Water Act provides EPA with a variety of mechanisms to prevent and control the discharge of oil or hazardous substances into or upon navigable waters, adjoining shorelines or the waters of the contiguous zone. First, in Section 311(b)(3), it prohibits such discharges "in harmful quantities" and provides specific authority to enforce that prohibition. ^{9/} Second, it authorizes the Agency to issue regulations, under Section 311(j), establishing procedures, methods and equipment requirements to prevent the discharge of oil and hazardous substances from onshore and offshore facilities and to contain such discharges. The procedures, methods and equipment required of facilities under these regulations are referred to as Spill Prevention Control and Countermeasure Plans (SPCC). Third, under Section 311(c) EPA is authorized to remove such oil or substance. ^{10/}

In establishing preventive measures for underground storage tanks, the SPCC provisions are probably the most useful authority under Section 311. The SPCC regulations apply to discharges from, among other sources, "onshore facilities." The term "onshore facility" is defined broadly in Section 311 to include "any facility...of any kind located in, or on, or under any land within the United States..." (emphasis added). The term "discharge" is also defined broadly to mean "any spilling, leaking, ... emitting, [or] emptying..." ^{11/} Another important consideration

^{9/} In the case of oil, EPA has issued regulations defining "harmful quantity" as that quantity which violates an applicable water quality standard or causes a film or sheen on the water or adjoining shoreline (40 C.F.R. §110.3).

^{10/} See p. 20 for a discussion of this authority.

^{11/} This broad definition of "discharge" stands in contrast to the more narrow term "discharge of pollutants" that defines the jurisdiction of the NPDES program. See p. 12.

is that, unlike other EPA authority, the SPCC authority can be used to address oil. Thus the broad authority of the SPCC program would appear to reach the types of underground storage tanks of concern to EPA.

Under the SPCC authority EPA can issue regulations "establishing procedures, methods, and equipment and other requirements for equipment," which would encompass preventive measures for underground tanks. In fact, EPA has issued regulations under the SPCC program addressing preventive measures for underground tanks. ^{12/}

There are, however, important limitations on EPA's authority under Section 311 that must be considered. While the language of Section 311(j) does not explicitly limit the SPCC program to discharges to navigable waters, this Section must be viewed in light of the Congressional policy stated in Section 311(b) that there should be "no discharges of oil or hazardous substances into or upon...navigable waters [or] adjoining shorelines...." Thus there must be a nexus between the facility and navigable waters in order to invoke SPCC jurisdiction. ^{13/}

It is unclear what would be a sufficient nexus to invoke SPCC jurisdiction. EPA could not base SPCC jurisdiction on an argument that ground water is "navigable waters." Several courts have rejected the notion that ground water constitutes "navigable waters" under the CWA. ^{14/} The Department of Justice has recently suggested that EPA's contention that any release to ground water that is likely to reach surface water can be reached by Section 311 is unduly broad. ^{15/} Thus, EPA's jurisdiction under the SPCC program cannot, at this time, be clearly specified.

^{12/} These regulations, for example, require consideration of measures to prevent corrosion of buried metallic tanks and to periodically test the tanks for leaks. Significantly, these regulations currently exclude underground tanks holding less than 42,000 gallons. §112.1(d)(2).

^{13/} EPA's SPCC regulations explicitly recognize this limitation, by providing that they do not apply to "onshore and offshore facilities which, due to their location, could not reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines."

^{14/} Exxon v. Train, 554 F.2d 1310 (5th Cir. 1977); United States v. GAF, 389 F.Supp. 1379 (S.D. Tex. 1975). But see United States v. Phelps Dodge Corp., 391 F.Supp. 1181 (D. Ariz. 1975).

^{15/} Letter from Stephen D. Ramsey, Department of Justice, to Louise Jacobs, Associate Enforcement Counsel, EPA, dated June 22, 1983.

One other jurisdictional limit in Section 311 should be mentioned. Certain discharges that are permitted under the NPDES program (or considered in the context of NPDES permit proceedings) are excluded from the Section 311 program. If EPA decides to consider use of Section 311 authority to address underground tanks, the scope of this exclusion will need to be examined further.

The statutory basis underlying the SPCC program is that the regulations must "prevent discharges of oil and substances from...onshore facilities."

Action Required:

1. EPA would need to consult with the Department of Justice and clarify the scope of its jurisdiction under Section 311.
2. EPA would need to issue appropriate rules for underground storage tanks under Section 311(j).

F. NPDES Program Under the CWA

Under Section 301 of the CWA, the "discharge of pollutants" is prohibited, except to the extent that such discharge is authorized under a permit issued under the Agency's NPDES program. It has been argued that a discharge from an underground tank to ground water, which in turn migrates to navigable waters, could be viewed as a discharge prohibited under Section 301. ^{16/} If such a discharge were subject to Section 301, EPA could require such releases to be halted when they occur and require such operations to obtain NPDES permits. EPA could establish specific effluent limitations (including a zero-discharge requirement) in NPDES permits issued for such tanks. Such effluent limitations would need to be based on a consideration of "best available technology economically achievable" as well state water quality standards. Under Section 304(e) and Section 402(a) EPA may also include in NPDES permits "best management practices" designed to "control plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage"

^{16/} This theory is suggested in the letter from Ramsey to Jacobs, mentioned in footnote 15.

that "may contribute significant amounts of...pollutants to navigable waters." EPA's authority to issue a permit including such requirements could be viewed as a mechanism for imposing preventive measures on underground tanks.

There are, however, several flaws in the argument for NPDES jurisdiction over leaking underground storage tanks. EPA's jurisdiction under the NPDES program is founded on the presence of a "discharge of pollutants." Section 502(12) defines that term to include "any addition of any pollutant to navigable waters from any point source." "Point source" is defined as "any discernible, confined and discrete conveyance..." As indicated earlier, the discharge from a tank to the ground water is not itself a "discharge of pollutants" because ground water is not navigable waters. The migration of pollutants with ground water to surface water is generally viewed as nonpoint source pollution and thus not subject to the NPDES program. Specifically, this conclusion is based on the language providing that a discharge of pollutants come "from a point source." EPA has historically taken the position that this requirement means that a pollutant must first enter navigable water through a point source. ^{17/} Thus it would be difficult for EPA to argue that the migration of contaminated ground water into surface water is subject to the NPDES program. Even if this argument were accepted, EPA would only be able to permit such sources where it could reasonably be shown that the contaminated ground water would in fact enter the navigable waters.

An additional practical problem associated with the use of Section 301 authority is the prospect that there could be a considerable delay between the time that a leak is detected and the time that effective action could be taken. A leak from an underground tank would not violate Section 301 until the contaminated ground water entered navigable waters. Given the slow movement of ground water in many situations, it may take several years before a detected leak could be addressed by Section 301.

Action Required:

1. EPA would have to reassess its interpretation of the "discharge of pollutants" definition.

^{17/} This argument has been the key to EPA's contention, for example, that it does not have jurisdiction over many dams. This argument was accepted in National Wildlife Federation v. Gorsuch, 693 F.2d 156, 175 (D.C. Cir. 1982).

2. EPA would then enforce Section 301 against tanks causing contamination of surface water.

3. If it sought to issue permits to such tanks, EPA could consider the development of effluent limitations guidelines for this class of point sources.

11. Cleanup Measures

The second major component of a control strategy for underground storage tanks is a program for cleaning up ground water once a leak occurs. If the Agency believes such a program is the appropriate action to take, we may consider use of the following authorities:

A. Response Actions under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund)

CERCLA authorizes EPA to undertake removal and remedial actions which are consistent with the National Contingency Plan (NCP) whenever there is a release (or threatened release) of hazardous substances into the environment or whenever the release (or threatened release) of pollutants or contaminants into the environment may present an imminent and substantial endangerment to human health or welfare. Section 104(a). "Removal" is generally defined in CERCLA to include the cleanup or removal of hazardous substances, pollutants or contaminants. Section 101(23). "Remedial" actions are "those actions consistent with permanent remedy...to prevent or minimize the release" of these materials. Section 101(24).

Under CERCLA, EPA would be authorized to respond to an underground storage tank which is leaking hazardous substances, pollutants or contaminants into soil or ground water by removing those materials from the tank. In addition, EPA could undertake corrective action to decontaminate both the soil underlying the tank and affected ground water.

There are several jurisdictional limitations and conditions associated with CERCLA response actions. The most significant for purposes of this memorandum is that response actions may only be taken where there is a release, or a threat of a release, of a "hazardous substance", "pollutant" or "contaminant". These terms are defined in Sections 101(14) and 104(a)(2) of CERCLA, and while they include a broad array of materials, they do not include "petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance." Therefore, for releases of gasoline or other petroleum products covered by this exclusion, EPA lacks the authority to spend Superfund monies in response until the Agency has designated these products as hazardous substances.

Jack Ravan

Additional Questions For The Record of the November 29, 1983
Hearing on Groundwater Contamination

Q. How does the FY 84 budget for the Underground Injection Control Program compare with the FY 83 budget?

A. The FY 1984 budget for the UIC program, including the enforcement component, increased by 26.9 workyears (22%) and \$637,500 (15%) from FY 1983. These increased resources are supporting the Agency's activities to delegate primacy for programs to all qualified States and for program implementation in non-primacy States beginning in April, 1984.

Question:

What is known about the toxicity of the toxic organic chemicals named in the 1981 CEQ report "Contamination of Groundwater by Toxic Organic Chemicals."

Answer:

In Table 8 of the CEQ Report 33 chemicals are listed as having been detected in drinking water wells. The report does not state whether these are public water supply wells or private homes. It also gives no indication of frequency of occurrence or of the basis for describing them as "Toxic".

Four of the chemicals have national drinking water regulations; chloroform, dibromomethane, bromoform and lindane - there are also two isomers of lindane listed. EPA Health Advisories or related advice have been provided for 14 of them. Phase I Recommended Maximum Contaminant Levels and Criteria Documents have been prepared for 8 of them and these are expected to be in the Federal Register in February. Nine of the remaining 12 are not considered to be highly toxic; one (parathion) is acutely toxic but not highly stable and two other are possible carcinogens in animal tests. Several of the chemicals not in our Phase I RMCL list are candidates among many others in Phase II.

This isolated list was not the source of our categorical grouping for standards review. We divided our regulations activity into four categories. The groupings were based upon many factors including: availability of occurrence data; availability of sufficient toxicology data for a technically supportable risk evaluation; level of concern based upon frequency and level of detection or toxicology or both. Finally we had to consider the available resources and prioritize our work.

The four Phases are as follow:

- I. Volatile Synthetic Organic Chemicals
- II. Inorganic Chemicals, Other Synthetic Organic Chemicals (mostly pesticides) and Microbial Contaminants
- III. Radionuclides
- IV. Byproducts of Disinfection

Phase I - Fourteen VOCs were listed in our ANPRM. Based upon the Ground Water Supply Survey results, several of them were found at high frequency (up to about 7%) and others were seldom found. Nine have been selected based upon frequency, exposure potential and toxicology for RMCL proposal. Remaining VOCs will be reconsidered in Phase II.

Phase II - This is by far the largest group numerically and also the broadest in type. It includes organic and inorganic chemicals and biological contaminants. At least six microbial contaminants, 23 inorganics and 40 organic chemicals are being considered. Pesticides are the largest portion of the organics. Among the key contaminants being considered are asbestos, lead, aldicarb, EDB, DBCP and virus and giardia lamblia.

Interim Primary Regulations were promulgated for 27 substances and 9 others are covered by secondary regulations. All of these regulations must be updated and revised.

The pesticides have received very high priority because of recent findings. Previously they were not considered to be likely drinking water contaminants but contamination has been detected in several areas. We are especially concerned about developing standards for pesticides that are injected into the ground and those that are used in or near drinking water.

Phase III - Radionuclides were regulated comprehensively in the interim regulations. In addition to revisions we are examining radon and uranium for possible drinking water standards.

Phase IV - Disinfection processes are the primary source of many byproduct chemicals entering drinking water. Trihalomethanes - the principal group of synthetic organics in drinking water were covered in the interim regulations. These are going to be revised when current research is completed to examine other organics - such as haloacetonitriles and chlorinated acids, aldehydes and alcohols as well as the disinfectants themselves - chlorine, chloramines, chlorine dioxide, chlorite and chlorate. Regulatory activity is scheduled to begin in late 1985 as the ongoing research becomes available to EPA.

We hope this gives you a good understanding of the tremendous amount of regulatory work we are engaged in and the basis for our categorization of that work.

Responses to Questions Raised
at Durenberger Hearing of
November 29, 1983

Questions 1 & 2. How much information relevant to the potential of aldicarb to pollute groundwater was submitted along with the registration application? (p. 68).

What additional information relevant to groundwater contamination was available later? When? Was it submitted voluntarily or requested by EPA? (p. 68).

Our registration files are not organized in such a way that it is usually possible to discern when or why particular studies were submitted to the Agency during a pesticide's registration history. Therefore, we are unable to identify precisely which aldicarb studies on file in the Office of Pesticide Programs were submitted along with the initial application for registration. However, we do know that aldicarb was first registered in 1969, and that studies submitted before 1970 were generally conducted in support of the original registration. A list of all the studies currently available on aldicarb is attached and we have highlighted those studies submitted before 1970.^{1/} In addition, aldicarb groundwater contamination in Long Island first came to EPA's attention in August 1979. Soil and groundwater studies and the 29-day rat drinking water toxicology study submitted since that time were generated in response to the Long Island situation. Other studies, both before and after 1979, were generally submitted in support of one or more of aldicarb's many registered uses, the most recent being its uses on citrus and sorghum.

^{1/} The list referred to has been retained in committee files.

Question 3. Is EPA now routinely requiring, as part of a registration application, information on the potential for at hand examples?)

Is an explicit assessment of groundwater contamination potential made for each pesticide?

During the registration process, EPA does routinely assess groundwater contamination potential of each outdoor use pesticide. This assessment is based on laboratory and field studies on the environmental fate of the chemical in combination with the field characteristics of the proposed use area and the use directions. EPA has set forth the data requirements required to support registration of outdoor use products in Part 158, a rule proposed last year and currently being prepared in final form. (Please see the attached copy.) ^{1/}

The level of documentation on ground water concerns in a registration review will depend on the chemical in question; reviews may discuss the environmental fate generally, or may make specific reference to ground water if that is a particular concern. Similarly, during the reregistration process, ground water contamination potential is evaluated, and this assessment is explicit in the resulting registration standard.

If the review indicates environmental persistence and leachability of pesticide residues and a shallow unconfined aquifer in the proposed use area, then additional field testing would be required of the registrant. Listed below are examples of pesticides for which ground water studies have been required. The first three pesticides listed below are still in the initial registration process and ground water studies were required as a precondition to the registration.

1. Aldoxycarb - Due to its potential to contaminate ground water, results of field monitoring (dissipation) data were required and they have been reviewed. Union Carbide has been asked to provide further information on this matter before a decision is made on aldoxycarb's use on peanuts and cotton.
2. OK 174 - Since this new chemical rapidly degrades to carbofuran (a chemical with a high leaching potential) in soil, we required that the registrant conduct a field monitoring study for leaching of OK 174 and its degradation products.
3. Carbosulfan - This new chemical also degrades to carbofuran in soil. Therefore, we required field dissipation data defining the leaching potential of carbosulfan and its degradation products in the field when applied to sorghum.

^{1/} The attachment referred to has been retained in committee files.

4. Aldicarb - In 1979, EPA was informed that aldicarb residues had been found in the ground water of Long Island, N.Y. Since that time, we have required ground water monitoring studies be done by Union Carbide (the manufacturer). In some cases, along with using monitoring data, we have run computer models in order to determine if other proposed uses of aldicarb will result in ground water contamination.

5. Carbofuran - Because of the concern over the potential for ground water contamination by carbofuran, the registrant (FMC Corp.) was requested to conduct a field monitoring study in Maryland. Data have been received for review.

6. Ridomil - Review of the data showed Ridomil to be a potential ground water contaminator and a ground water monitoring study was required of the registrant. The study, conducted in Maryland to support use on tobacco, showed only minor impact (less than 2.1 ppb) on ground water at the test site after more than a year of monitoring.

Question 4. How many of the Toxic drinking water contaminants mentioned in the 1981 CEQ study are the subject of TSCA Section 4 test rules and negotiated testing agreements?

The report identified 10 chemicals that are the subject of TSCA Section 4 actions. They are:

- 1,1,1-Trichloroethane
- Xylene
- Toluene
- Methylene Chloride
- Bis (2-ethylhexyl) phthalate
- Di-n-butylphthalate
- Ethylbenzene
- Diethyl phthalate
- Butyl benzyl phthalate
- Chloromethane

GROUND WATER CONTAMINATION

WEDNESDAY, JANUARY 18, 1984

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON TOXIC SUBSTANCES
AND ENVIRONMENTAL OVERSIGHT,
Rochester, Minn.

NOTE: Due to circumstances beyond the control of the Committee on Environment and Public Works, transcripts of today's proceedings are unavailable. Written statements submitted for the record follow:

(149)

OPENING STATEMENT BY
SENATOR DAVE DURENBERGER
HEARING ON THE SAFE DRINKING WATER ACT
BY THE SUBCOMMITTEE ON
TOXIC SUBSTANCES AND ENVIRONMENTAL OVERSIGHT
JANUARY 18, 1984
ROCHESTER, MN

GOOD MORNING AND WELCOME TO THIS HEARING. IT IS BEING CONDUCTED BY THE UNITED STATES SENATE SUBCOMMITTEE ON TOXIC SUBSTANCES AND ENVIRONMENTAL OVERSIGHT, WHICH I AM PRIVILEGED TO CHAIR. THE SUBJECT OF TODAY'S HEARING IS GROUNDWATER CONTAMINATION AND THE ADEQUACY OF EXISTING LAWS IN THE PROTECTION OF GROUNDWATER. WE WILL ALSO BE TAKING TESTIMONY ON PROVISIONS OF THE SAFE DRINKING WATER ACT.

GOUNDWATER IS THE SOURCE OF ABOUT 50 PERCENT OF THE DRINKING WATER IN THE UNITED STATES. IT IS ALSO USED IN

HUGE QUANTITIES FOR IRRIGATION AND INDUSTRIAL PURPOSES.

THERE ARE NO FEDERAL LAWS AND FEW STATE LAWS WHICH HAVE GROUNDWATER PROTECTION AS THEIR PRINCIPAL PURPOSE. SOME LAWS HAVE THE COLLATERAL EFFECT OF PROTECTING DRINKING WATER. FOR EXAMPLE, THE FEDERAL HAZARDOUS WASTE LAW, KNOWN AS THE RESOURCE CONSERVATION AND RECOVERY ACT, REGULATES THE STORAGE, TREATMENT AND DISPOSAL OF TOXIC WASTES. AN INDIRECT RESULT IS THE PROTECTION OF GROUNDWATER. THERE IS, HOWEVER, NO SINGLE FEDERAL LAW WHICH HAS AS IT PRINCIPAL FOCUS THE PROTECTION OF GROUNDWATER.

THE IMPORTANCE OF GROUNDWATER TO THE NATION GROWS DAILY. IN 1950, THE UNITED STATES USED 34 BILLION GALLONS OF GOUNDWATER. IN 1980, GROUNDWATER USAGE HAD ALMOST TRIPLED, RISING TO 88.5 BILLION GALLONS.

AT THE SAME TIME THAT GROUNDWATER USAGE HAS BEEN INCREASING, ITS CONTAMINATION HAS RISEN SHARPLY AS WELL. IN

1980, THE LIBRARY OF CONGRESS REPORTED THAT OVER 1,200 WELLS AND WELL FIELDS HAD BEEN CLOSED BECAUSE OF CONTAMINATION. FOR EXAMPLE, IN THE SAN JOAQUIN VALLEY OF CALIFORNIA, OVER ONE-THIRD OF THE WELLS ARE CONTAMINATED BY A PESTICIDE KNOWN TO CAUSE STERILITY AT HIGHER DOSAGE LEVELS. THROUGHOUT THE EASTERN UNITED STATES OTHER WELLS ARE CONTAMINATED BY AN INDUSTRIAL SOLVENT, TCE. HERE IN MINNESOTA, WELLS IN LONG PRAIRIE AND NEW BRIGHTON HAVE ALSO BEEN CLOSED BECAUSE OF TCE CONTAMINATION, FORCING RESIDENTS TO RELY UPON BOTTLED WATER.

DESPITE THESE INCIDENTS OF CONTAMINATION, GROUNDWATER REMAINS AS AN ESSENTIALLY CLEAN RESOURCE. THE QUESTION FOR THESE HEARINGS IS WHETHER ACTION SHOULD BE TAKEN NOW TO ASSURE THAT GROUNDWATER REMAINS CLEAN AND, IF SO, WHETHER THAT ACTION SHOULD BE TAKEN AT THE STATE OR FEDERAL LEVEL.

WE IN MINNESOTA ARE FORTUNATE. IN OUR STATE THERE IS A PROGRAM TO SYSTEMMATICALLY TEST ALL GROUNDWATER PUBLIC

WATER SUPPLIES FOR CONTAMINATION. ONLY A HANDFUL OF STATES HAVE ADOPTED SUCH A PROGRAM. ONE QUESTION FOR THIS HEARING IS WHETHER SUCH TESTING SHOULD TAKE PLACE THROUGH THE NATION AS A WAY TO INVENTORY THE GROUNDWATERS OF THE UNITED STATES.

DEPENDING ON THE OUTCOME OF THIS AND OTHER HEARINGS, THE SUBCOMMITTEE MAY UNDERTAKE THE DRAFTING AND ENACTMENT OF EITHER A LAW OR AMENDMENTS TO OTHER LAWS TO PROTECT THE GROUNDWATER RESOURCES OF THE UNITED STATES. I EXPECT THAT OTHER HEARINGS WILL BE HELD IN OTHER STATES AS WELL AS IN WASHINGTON. THIS SUBCOMMITTEE HAS JURISDICTION OVER THE SAFE DRINKING WATER ACT. I WILL BE INTRODUCING AMENDMENTS TO THAT ACT IN EARLY FEBRUARY. HEARINGS SPECIFICALLY ON THE SAFE DRINKING WATER ACT WILL BE HELD IN WASHINGTON BEFORE MARCH, WITH THE HOPE THAT LEGISLATION CAN BE CONSIDERED BY THE FULL SENATE YET THIS YEAR. FOR THE MOMENT, HOWEVER, I THINK THE TIME HAS ARRIVED TO GET THIS HEARING UNDERWAY.

WOULD THE FIRST PANEL OF WITNESSES COME FORWARD AND TAKE THEIR SEATS.

STATEMENT ON GROUND WATER ISSUES

BY
MICHAEL ROBERTSON
ASSISTANT EXECUTIVE DIRECTOR
MINNESOTA POLLUTION CONTROL AGENCY

BEFORE THE
U.S. SENATE SUBCOMMITTEE ON TOXIC SUBSTANCES
AND ENVIRONMENTAL OVERSIGHT
SENATOR DAVE DURENBERGER, CHAIRMAN
JANUARY 18, 1984
ROCHESTER, MINNESOTA

MINNESOTA'S GROUND WATER IS A VALUABLE YET VULNERABLE RESOURCE WHICH HAS LARGELY BEEN TAKEN FOR GRANTED OVER THE YEARS. YET, TWO OF EVERY THREE MINNESOTANS DEPEND ON IT AS A HIGH QUALITY SOURCE OF DRINKING WATER. ADD TO THIS THE MANY USES OF GROUND WATER IN INDUSTRIAL PROCESSES AND AGRICULTURE AND THIS RESOURCE TAKES ON ADDED SIGNIFICANCE.

MINNESOTA IS BLESSED WITH AN ABUNDANCE OF HIGH QUALITY GROUND WATER IN BOTH ITS BEDROCK AND THE UNCONSOLIDATED GLACIAL DEPOSITS WHICH OVERLIE THE BEDROCK. ESTIMATES OF THE TOTAL AMOUNT OF GROUND WATER IN MINNESOTA VARY BUT RESERVES LIKELY APPROACH ONE TRILLION GALLONS. ALTHOUGH THIS DOES NOT REPRESENT THE AMOUNT OF WATER WHICH CAN BE WITHDRAWN PRACTICALLY FROM WELLS, IT DOES PROVIDE AN IDEA OF HOW MUCH OF THE STATE'S WATER SUPPLY IS GROUND WATER.

JUST AS THE DECADES OF THE SIXTIES AND SEVENTIES FOCUSED ON CLEANING MINNESOTA'S SURFACE WATER, THE DECADES OF THE EIGHTIES AND NINETIES ARE SHIFTING THIS EMPHASIS TO OUR GROUND WATER SUPPLIES. NOTWITHSTANDING THE MORE VISIBLE SURFACE WATER PROBLEMS, WE ARE BEGINNING TO SEE IN OUR HISTORICALLY CLEAN AND ABUNDANT GROUND WATER SUPPLIES THE EVIDENCE OF PAST NEGLECT. CURRENT INDICATIONS ARE THAT WHILE A RELATIVELY SMALL PERCENTAGE OF AVAILABLE GROUND WATER HAS BEEN DEGRADED, INCIDENTS OF CONTAMINATION ARE WIDESPREAD AND THERE MAY BE POLLUTANTS ALREADY IN GROUND WATER THAT MAY NOT APPEAR FOR YEARS OR DECADES IN DRINKING WATER SUPPLIES.

GROUND WATER USE IN MINNESOTA HAS INCREASED DRAMATICALLY IN THE PAST DECADE. IN 1976, GROUND WATER WAS 14 PERCENT OF THE TOTAL WATER WITHDRAWN. CURRENTLY, THAT FIGURE IS CLOSER TO 25 PERCENT. GENERALLY, THIS WATER USE FALLS INTO THE CATEGORIES OF PUBLIC WATER SUPPLY, RURAL DOMESTIC AND LIVESTOCK, IRRIGATION,

THERMOELECTRIC POWER GENERATION, AND SELF-SUPPLIED INDUSTRIAL USE. PUBLIC WATER SUPPLIES AND IRRIGATION TOGETHER ACCOUNT FOR CLOSE TO 50 PERCENT OF GROUND WATER USED IN MINNESOTA. DESPITE THE GENERALLY POSITIVE PICTURE OF SUPPLY AND DEMAND, THERE ARE SIGNIFICANT CAUTIONS. WHERE USERS ARE CONCENTRATED, LOCALIZED SHORTAGES CAN OCCUR, EITHER DUE TO WELL INTERFERENCE OR WATER QUALITY PROBLEMS. MAJOR NATURAL OCCURRENCES, SUCH AS THE DROUGHT OF 1976-1977, CANNOT BE ACCURATELY PREDICTED AND CAN ALSO CAUSE UNANTICIPATED SHORTAGES.

IN SPITE OF MINNESOTA'S NONDEGRADATION POLICY TOWARD GROUND WATER QUALITY, CONTAMINATION HAS OBVIOUSLY TAKEN PLACE. INVENTORIES HAVE BEEN MADE BY THE MINNESOTA POLLUTION CONTROL AGENCY (MPCA) OF FACILITIES WHICH MAY BE THE SOURCE OF GROUND WATER CONTAMINATION.

A ROUGH APPROXIMATION OF THE POTENTIAL THREAT TO OUR GROUND WATER IS REPRESENTED IN THE FOLLOWING NUMBERS. THERE ARE AS MANY AS 5,000 BUSINESSES IN THE STATE WHICH ARE BELIEVED TO GENERATE A HAZARDOUS WASTE. APPROXIMATELY 140 OF THEM REQUIRE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) PERMITS TO TREAT, STORE, AND/OR DISPOSE OF HAZARDOUS WASTE. THE 1980 MPCA OPEN DUMP INVENTORY SHOWED THERE ARE APPROXIMATELY 1,400 ACTIVE AND ABANDONED LANDFILLS AND DUMPS, ABOUT 130 OF WHICH ARE OPERATING, PERMITTED SANITARY LANDFILLS. ALTHOUGH MOST PERMITTED LANDFILLS HAVE GROUND WATER MONITORING SYSTEMS IN-PLACE, THE EFFECTS OF ABANDONED SITES ON GROUND WATER ARE LARGELY UNKNOWN. THE LEGISLATIVE COMMISSION ON MINNESOTA RESOURCES (LCMR) IS CURRENTLY PROVIDING MONETARY SUPPORT TO MPCA FOR A TWO-YEAR STUDY OF THE EFFECTS OF 15 OF THESE DUMP SITES ON GROUND WATER RESOURCES.

IN ADDITION TO LAND DISPOSAL SITES, THERE ARE AN ESTIMATED 300,000 INDIVIDUAL SEPTIC SYSTEMS PLUS AN ADDITIONAL NUMBER OF LARGER DRAINFIELD AND OTHER TYPES OF LAND APPLICATION SYSTEMS SERVING MUNICIPALITIES AND INDUSTRIES. A THIRD OF A MILLION TONS OF SEWAGE SLUDGE IS SPREAD AT 1,000 SITES ACROSS THE STATE. TRANSPORTATION RELATED ACCIDENTS ALSO POSE A SIGNIFICANT THREAT. THERE ARE OVER 3,000 MILES OF PIPELINES AND 7,000 MILES OF RAILROAD TRACK IN THE STATE. THERE ARE 130,000 MILES OF ROADWAYS, WHICH REPRESENT NOT ONLY AN ACCIDENT POTENTIAL, BUT ARE SALTED EACH WINTER. THERE ARE NEARLY 600 SALT STORAGE AREAS TO SUPPORT THAT EFFORT.

INCONSISTENT ENFORCEMENT OF MONITORING REGULATIONS HAS OCCURRED BECAUSE REQUIREMENTS HAVE CHANGED RAPIDLY OVER A SHORT PERIOD OF TIME AND HAVE NOT BEEN UNIFORMLY APPLIED TO ALL FACILITIES. THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) HAS ALSO IDENTIFIED INADEQUATE GROUND WATER MONITORING AT PERMITTED HAZARDOUS WASTE FACILITIES NATIONWIDE AS A MAJOR PROBLEM.

THERE ARE TWO OTHER TYPES OF FACILITIES WHICH ARE RECEIVING SPECIAL FEDERAL ATTENTION UNDER EPA'S PENDING NATIONAL GROUND WATER PROTECTION STRATEGY. THEY ARE UNDERGROUND BULK STORAGE TANKS AND SURFACE IMPOUNDMENTS. THERE ARE AN ESTIMATED 4,000 UNDERGROUND BULK STORAGE SITES IN MINNESOTA. LEAKAGE FROM THE UNDERGROUND STORAGE OF LIQUIDS, MOSTLY PETROLEUM PRODUCTS, IS ESTIMATED TO BE OCCURRING IN 25-50 PERCENT OF ALL UNDERGROUND TANKS. THE VOLUME OF LIQUID, WHICH CAN BE LOST FROM AN UNDERGROUND STORAGE TANK, IS NOT LIMITED TO THE VOLUME OF THE TANK. SMALL LEAKS MAY GO UNNOTICED, CONTAMINATING A LARGE AREA IN THE VICINITY OF THE TANK BEFORE BEING DETECTED. THE STATE WILL BE FOLLOWING EPA'S INVESTIGATION OF THIS PROBLEM AND PLAN ANY NEW REGULATIONS ACCORDINGLY.

SURFACE WASTE IMPOUNDMENTS ARE NATURAL DEPRESSIONS, ARTIFICIAL EXCAVATIONS, OR DIKED AREAS WHICH ARE USED TO STORE OR DISPOSE OF A LIQUID OR SEMI-LIQUID WASTE. THE INVENTORY OF MUNICIPAL, INDUSTRIAL, AGRICULTURAL, AND MINING IMPOUNDMENTS REPORTED 2,733 ACTIVE AND ABANDONED IMPOUNDMENTS. ANIMAL FEEDLOT WASTE STORAGE AREAS COMPRISE THE LARGEST FRACTION (1,500) OF THE TOTAL. WE SUPPORT EPA'S EFFORT IN BOTH OF THESE AREAS, AND WILL BE FOLLOWING THEIR PROGRESS CLOSELY.

NOW, TO FOCUS ON JUST THE HAZARDOUS WASTE PROBLEM, CONSIDER THE FOLLOWING. IN MARCH 1983, 61 SITES WERE IDENTIFIED ON THE MPCA HAZARDOUS WASTE SITE RESPONSE LIST - 36 IN THE SEVEN-COUNTY METROPOLITAN AREA, AND 25 IN THE REMAINDER OF THE STATE. THE SITES INCLUDED 64 PERCENT WHERE DISPOSAL OCCURRED ON THE SITE WHERE THE WASTE WAS GENERATED, 17 PERCENT WHERE WASTE WAS DEPOSITED IN KNOWN LANDFILLS AND DUMPS, AND 17 PERCENT WHERE DISPOSAL OCCURRED IN RANDOM DUMP SITES. THE MAJORITY OF THESE SITES INVOLVE GROUND WATER CONTAMINATION BY ORGANIC SOLVENTS. WHEN A NEW SITE IS INVESTIGATED, CONTAMINANTS MUST BE IDENTIFIED AND THE GROUND WATER FLOW AND THE EXTENT OF THE AFFECTED AREA MUST BE DELINEATED. REMEDIAL ACTION FOR GROUND WATER CLEANUP MAY INCLUDE SURFACE CLEANUP, PHYSICAL CONTAINMENT, AND AQUIFER REHABILITATION.

AVERAGE CLEANUP COSTS OF GROUND WATER CONTAMINATION IN THE UNITED STATES VARY WIDELY FROM SITE TO SITE. THE HYDROGEOLOGIC INVESTIGATION TO DEFINE THE EXTENT OF A PROBLEM MAY RANGE FROM TENS OF THOUSANDS TO MILLIONS OF DOLLARS. THE ACTUAL CLEANUP CAN EASILY RUN INTO MILLIONS OF DOLLARS PER YEAR, WITH COMPLETION POSSIBLY TAKING DECADES.

THE MAGNITUDE OF THE PROBLEM IS DIFFICULT TO PROJECT, BUT CONSIDER THE FOLLOWING. WITHIN THE SEVEN-COUNTY METROPOLITAN AREA, AN INVENTORY OF CLOSE TO 400 SITES WHERE HAZARDOUS WASTE DISPOSAL MAY HAVE TAKEN PLACE HAS BEEN DEVELOPED BY THE MPCA STAFF. INFORMATION REGARDING MANY OF THESE SITES STILL NEEDS TO BE FIELD-VERIFIED. THEY INCLUDE ABANDONED DUMPS, HAZARDOUS WASTE SITES, SPILLS, PERMITTED SANITARY LANDFILLS, INDUSTRIAL WASTE DUMPS, FLY ASH SITES, SURFACE IMPOUNDMENTS, FEEDLOTS, FOUNDRY SAND AND SLAG SITES, SLUDGE SITES, TREE DISPOSAL SITES, AND DEMOLITION SITES.

FINALLY, IN CERTAIN AREAS OF THE STATE, AN ABUNDANCE OF GROUND WATER AND GEOLOGIC CONDITIONS SENSITIVE TO CONTAMINATION COMBINE TO CALL FOR GENERAL CAUTION IN ALL LAND USE ACTIVITIES. THESE CRITICAL AREAS ARE THE KARST REGION OF THE STATE, WHERE FRACTURED LIMESTONE AND DOLOMITE ARE COVERED ONLY BY A THIN LAYER OF SOIL, AND THE SANDPLAIN AND OUTWASH AREAS, WHERE SAND AND GRAVEL WITH SOME SILT AND CLAY ARE FOUND IN ALLUVIAL PLAINS OR WIDE CHANNELS. ONCE CONTAMINATION OCCURS IN THESE AREAS, IT MAY SPREAD RAPIDLY AND MAY AFFECT THE DRINKING WATER OF MANY PEOPLE. THIS IS BECAUSE WELLS MAY BE, FOR ALL PRACTICAL PURPOSES, PUMPING SURFACE WATER FROM AQUIFERS WHERE LITTLE NATURAL PROTECTION IS AVAILABLE.

THE MANAGEMENT OF MINNESOTA'S GROUND WATER RESOURCE MUST CONTINUE TO BE A DYNAMIC, ONGOING EFFORT. THREATS TO THE QUALITY AND QUANTITY OF OUR AQUIFERS WILL NOT BE CONTROLLED QUICKLY BECAUSE GROUND WATER, BY ITS NATURE, IS GENERALLY NOT AMENABLE TO "QUICK-FIX" SOLUTIONS. THE EFFORT TO DEVELOP A COMPREHENSIVE GROUND WATER MANAGEMENT PROGRAM CAN NEVER BE PERMANENTLY BOUGHT OR ACHIEVED BUT ONLY TRANSIENTLY OBTAINED, AND WITH CONTINUED PERSISTENCE, PERPETUATED.

THE MPCA/EPA AGREEMENT FOR FISCAL YEAR 1981 IDENTIFIED THE NEED FOR MINNESOTA TO DEVELOP A COMPREHENSIVE GROUND WATER PROTECTION STRATEGY. AS LEAD AGENCY IN DEVELOPMENT OF WATER QUALITY MANAGEMENT PROGRAMS REQUIRED BY SECTION 208 OF THE CLEAN WATER ACT, THE MPCA RECEIVED FUNDING TO ASSIST THE STATE IN DEVELOPING A GROUND WATER PROTECTION STRATEGY FRAMEWORK. IN 1983, A STAFF FRAMEWORK REPORT WAS PREPARED WHICH REVIEWED EXISTING GROUND WATER PROGRAMS, ASSESSED THE MAGNITUDE AND EXTENT OF GROUND WATER CONTAMINATION IN THE STATE, AND EVALUATED THE EFFICACY OF EXISTING MPCA REVIEW, PERMITTING, AND MONITORING POLICIES FOR SEVERAL TYPES OF FACILITIES IN TERMS OF GROUND WATER IMPACTS.

FIVE GENERAL GOALS TO GUIDE FUTURE GROUND WATER PROGRAMS ARE IDENTIFIED IN THE MPCA'S GROUND WATER PROTECTION STRATEGY FRAMEWORK REPORT. THE FIVE GOALS ARE:

1. TO MAINTAIN THE QUALITY OF GROUND WATER TO LEVELS CONSISTENT WITH INTENDED BEST USE AND TO PREVENT DEGRADATION CONSISTENT WITH PUBLIC HEALTH, ECONOMIC, AND SOCIAL GOALS. FOR EXAMPLE, MINNESOTA'S CURRENT GROUND WATER QUALITY REGULATION HELPS PROVIDE ASSURANCE THAT OUR GROUND WATER SUPPLIES WILL REMAIN SUITABLE FOR USE AS DRINKING WATER BY PROHIBITING DISCHARGE OF CONTAMINANTS TO GROUND WATER.
2. TO ASSURE THAT LAND USE ACTIVITIES, WHICH HAVE OR MAY HAVE THE POTENTIAL TO IMPACT GROUND WATER, DO NOT ENDANGER THE VALUE OF AQUIFERS AND ASSOCIATED SURFACE WATER RESOURCES. FOR EXAMPLE, WE ARE SUPPORTING STATE LEGISLATION TO MINIMIZE DEPENDENCE ON LAND DISPOSAL OF SOLID WASTE AND MAXIMIZE RECOVERY OF RESOURCES.

3. TO MONITOR GROUND WATER TO DETERMINE AMBIENT CONDITIONS, WATER LEVELS, TRENDS, AND COMPLIANCE WITH REGULATORY REQUIREMENTS. FOR THE PAST FIVE YEARS, MPCA HAS OPERATED AN AMBIENT GROUND WATER QUALITY MONITORING PROGRAM CONSISTING OF ABOUT 400 WELLS AND SPRINGS REPRESENTING OUR PRINCIPAL AQUIFERS. UNTIL JUNE, 1985, THIS PROGRAM IS BEING SUPPORTED BY FUNDING FROM LCMR, WHICH ALLOWS EXPANDING THE PARAMETERS ANALYZED TO INCLUDE VOLATILE ORGANIC COMPOUNDS.
4. TO MANAGE ALL DISCHARGES, WITHDRAWALS, AND RECHARGES OF GROUND WATER TO ENSURE THAT THE ABOVE GOALS ARE REALIZED. THIS INVOLVES MULTI-AGENCY COOPERATION, ESPECIALLY AMONG MPCA, MINNESOTA DEPARTMENT OF HEALTH (MDH), AND MINNESOTA DEPARTMENT OF NATURAL RESOURCES (MDNR).
5. TO ENSURE THE AVAILABILITY, TRANSFER, AND APPROPRIATE USE OF PERTINENT INFORMATION, DATA, STRATEGIES, AND STUDIES TO INVOLVED INSTITUTIONS AND THE PUBLIC. CURRENTLY, THE SYSTEMS FOR WATER INFORMATION (SWIM) COMMITTEE OF THE LAND MANAGEMENT INFORMATION CENTER IS COORDINATING ORGANIZATION OF GROUND WATER DATA BASES OF VARIOUS STATE AGENCIES WITH WATER RESOURCE MANAGEMENT RESPONSIBILITIES. THIS EFFORT WILL RESULT IN EASIER ACCESS OF DIFFERENT AGENCIES TO EACH OTHER'S DATA BASES, AS WELL AS PROVIDING EACH AGENCY WITH BETTER MEANS OF ANALYZING ITS OWN DATA.

IN ADDITION, THERE ARE FOUR UNDERLYING PRINCIPLES WHICH SHOULD GUIDE IMPLEMENTATION OF FUTURE GROUND WATER PROGRAMS TO ACHIEVE THE ABOVE GOALS.

1. BUILD ON THE EXISTING INSTITUTIONAL SYSTEM FOR GROUND WATER MANAGEMENT:

THERE ARE AT LEAST 14 AGENCIES CURRENTLY ADMINISTERING OVER 80 PROGRAMS PERTAINING TO GROUND WATER MANAGEMENT IN MINNESOTA. HISTORICALLY, THE FACT THAT THERE ARE SO MANY INVOLVED PARTIES HAS HAD THE ADVANTAGE OF FORCING INSTITUTIONS TO COORDINATE THEIR EFFORTS IN ORDER TO PROVIDE FOR EFFECTIVE GROUND WATER MANAGEMENT. SEVENTY-FIVE PERCENT OF THE PRIMARY STATUTORY RESPONSIBILITIES AND REGULATORY PROGRAMS FOR GROUND WATER FALL WITHIN THREE AGENCIES: MINNESOTA DEPARTMENT OF NATURAL RESOURCES, MINNESOTA DEPARTMENT OF HEALTH, AND MINNESOTA POLLUTION CONTROL AGENCY. THE DIVISION OF AUTHORITIES AMONG THESE AGENCIES PLACES CONTROL OF WATER USE AND CONSERVATION, THAT IS WATER QUANTITY MANAGEMENT, IN THE MDNR; HEALTH-RELATED AND DOMESTIC SUPPLY MATTERS IN THE MDH; AND SURFACE AND GROUND WATER QUALITY ISSUES AND POLLUTION CONTROL REQUIREMENTS WITHIN THE MPCA. WHILE THIS DIVISION OF AUTHORITY SEEMS CLEAR CONCEPTUALLY, IT REQUIRES GREAT INTERDEPENDENCE AMONG THE AGENCIES. ALTHOUGH GROUND WATER MAY NOT BE THE MAJOR EMPHASIS OF EACH SEPARATE PROGRAM, THEIR OBJECTIVES ARE GENERALLY COMPATIBLE WITH GROUND WATER GOALS. ALTHOUGH SOME TOTALLY NEW GROUND WATER INITIATIVES ULTIMATELY MIGHT BE NECESSARY, THE EXISTING STRUCTURE OF THE OPERATING PROGRAMS ALREADY CONTAINS MUCH OF THE ESSENTIAL MANAGEMENT FRAMEWORK. THUS, THE FOCUS SHOULD BE TO EVALUATE EXISTING PROGRAMS CAREFULLY AND TO ADJUST THEM TO ENSURE THAT GROUND WATER WILL RECEIVE EQUAL EMPHASIS WITH SURFACE WATER IN ALL WATER MANAGEMENT AREAS.

2. ACKNOWLEDGE REGIONAL DIFFERENCES: ANOTHER STRATEGY EMPHASIS IS THE NEED TO ENCOURAGE REGIONAL GROUND WATER MANAGEMENT SENSITIVE TO LOCAL DIFFERENCES IN PHYSICAL RESOURCES, USES, AND PROBLEMS. SINCE AVAILABLE GROUND WATER IS NOT DISTRIBUTED EQUALLY, SINCE USES VARY FROM ONE LOCALITY TO ANOTHER, AND SINCE GROUND WATER IS MORE NATURALLY-PROTECTED IN SOME AREAS THAN OTHERS, PROBLEMS AND APPROPRIATE RESPONSES WILL DIFFER THROUGHOUT THE STATE AND THE NATION. LOCAL GOVERNMENT ALSO HAS AN IMPORTANT ROLE IN PROTECTION OF BOTH THE QUANTITY AND QUALITY OF GROUND WATER THROUGH ITS LAND USE CONTROL RESPONSIBILITIES.
3. ENCOURAGE FEDERAL PARTICIPATION: SUCCESSFUL IMPLEMENTATION OF A GROUND WATER STRATEGY WILL ALSO REQUIRE CONTINUING PARTICIPATION BY THE FEDERAL GOVERNMENT. FINANCIAL ASSISTANCE FOR PROGRAM DEVELOPMENT EFFORTS, COOPERATION IN DEVELOPING INFORMATION AND KNOWLEDGE ABOUT THE STATE'S GROUND WATER RESOURCES, DISSEMINATION OF INFORMATION ON MEANS OF SOLVING GROUND WATER PROBLEMS, AND THE SETTING OF STANDARDS FOR DRINKING WATER ARE ALL ACTIVITIES WHICH FEDERAL AGENCIES SHOULD CONTINUE.
4. TARGET A LONG-TERM PREVENTIVE STRATEGY: RESPONDING TO IMMEDIATE GROUND WATER PROBLEMS AND LEARNING FROM THE SUCCESS AND FAILURE OF THESE EFFORTS TO BEGIN TO ANTICIPATE FUTURE PROBLEMS ARE BUT THE BEGINNING OF THE DEVELOPMENT OF A LONG-TERM STRATEGY TO PROTECT THE QUANTITY AND QUALITY OF OUR GROUND WATER RESOURCES. SEVERAL SPECIFIC, LONG-TERM PROGRAM DEVELOPMENT EFFORTS SHOULD BE UNDERTAKEN IF THE EVENTUAL GOAL OF A SOUND GROUND WATER MANAGEMENT PROGRAM FOR MINNESOTA IS TO BE REALIZED. THESE MAY BE CATEGORIZED AS FOLLOWS:

- A. DEVELOP A GROUND WATER INVENTORY WHICH RECOGNIZES THE HIGH AMBIENT QUALITY OF MINNESOTA'S GROUND WATER, THE SENSITIVITY OF CERTAIN AQUIFERS IN THE STATE TO DEGRADATION OR DEPLETION, AND THE NECESSITY OF PROTECTING CRITICAL RECHARGE AREAS.
- B. DEVELOP AN AUTOMATED GROUND WATER DATA MANAGEMENT SYSTEM TO PROVIDE INFORMATION NECESSARY FOR EVALUATING IMMEDIATE IMPACTS AND MAKING DECISIONS, TO ASSEMBLE AND USE PERTINENT AMBIENT AND SITE-SPECIFIC DATA ON GROUND WATER QUANTITY AND QUALITY, AND TO PREVENT POTENTIAL PROBLEMS FROM OCCURRING BY GUIDING REGULATORY PROGRAM OPERATIONS.
- C. REFINE CURRENT PROGRAMS DEALING WITH ASSESSMENT AND CLEANUP OF UNREGULATED OR ILLEGAL LAND USES WHICH MAY IMPACT GROUND WATER.
- D. CONDUCT A REVIEW OF RULES FOR PERMITTING, OPERATING, AND MONITORING THOSE FACILITIES HAVING THE GREATEST POTENTIAL TO IMPACT THE QUALITY AND QUANTITY OF GROUND WATER RESOURCES.
- E. CONTINUE TO INVENTORY AND PRIORITIZE ACTIVITIES FOR WHICH THE POTENTIAL TO DEGRADE GROUND WATER IS EITHER KNOWN OR SUSPECTED.
- F. DEVELOP A STRATEGY TO ADDRESS EMERGING ISSUES IN GROUND WATER PROTECTION IN MINNESOTA SUCH AS GROUND WATER SOURCE HEAT PUMPS, UNDERGROUND INJECTION CONTROL, AQUIFER THERMAL ENERGY STORAGE, PEAT DEVELOPMENT, AND IRRIGATION SYSTEMS.

HAVING DESCRIBED AND HIGHLIGHTED THE GROUND WATER SITUATION IN MINNESOTA, IN

CLOSING, I WOULD LIKE TO OFFER A FEW COMMENTS ON THE SOON TO BE ANNOUNCED EPA GROUND WATER PROTECTION STRATEGY. WE BELIEVE THAT THE FUNDAMENTAL RESPONSIBILITY FOR PROTECTION AND MANAGEMENT OF THE RESOURCE SHOULD REST WITH THE STATES AND THAT FEDERAL SUPPORT, BOTH TECHNICAL AND FINANCIAL, IS CERTAINLY NECESSARY. HOWEVER, EPA'S INTENTION TO SET ASIDE OR EARMARK FUNDS FROM EXISTING PROGRAMS CREATES A PROBLEM IN MINNESOTA AND PROBABLY IN OTHER STATES AS WELL. THEY HAVE IDENTIFIED THE CLEAN WATER ACT, SECTION 205(J), RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), AND THE UNDERGROUND INJECTION CONTROL (UIC) PROGRAM OF THE SAFE DRINKING WATER ACT (SDWA) AS SOURCES OF FUNDING. WE ARE NOT A PRIMACY STATE FOR UIC, AND HAVE LONG SINCE PREPARED SPENDING PLANS FOR THE OTHER TWO PROGRAMS. ANY MONEY THAT EPA DEDICATES TO GROUND WATER UNDER THIS PROPOSAL WILL HAVE TO BE SHIFTED FROM SOME OTHER CURRENTLY FUNDED PROGRAM. SPECIFIC FUNDING FOR GROUND WATER PROGRAMS WOULD BE A MUCH BETTER ALTERNATIVE.

I HAVE ALREADY ALLUDED TO THE SECOND MAJOR ASPECT OF THIS PROPOSED NEW NATIONAL STRATEGY, THAT IS CONDUCTING SPECIAL STUDIES IN THE AREA OF UNDERGROUND STORAGE TANKS AND SURFACE IMPOUNDMENTS. ANOTHER AREA WHICH WE WOULD LIKE TO SEE EPA COORDINATE IS A NATIONAL AMBIENT WATER QUALITY MONITORING NETWORK. IN MINNESOTA, WE HAVE HAD SUCH A NETWORK FOR FIVE YEARS AND ARE NOW IN A POSITION TO FACTOR THE INFORMATION GAINED INTO OUR GROUND WATER PLANNING DECISIONS. IT WILL BE VERY IMPORTANT IN SETTING STANDARDS AND DETERMINING APPROPRIATE CLEANUP LEVELS AT WASTE SITES.

POTENTIALLY, THE MOST CONTROVERSIAL ASPECT OF THE STRATEGY IS EPA'S PROPOSAL TO GROUP AQUIFERS INTO THREE CLASSIFICATIONS: I. SPECIAL AQUIFERS, II. CURRENT

AND POTENTIAL SOURCES OF DRINKING WATER, AND III. AQUIFERS NOT CONSIDERED POTENTIAL SOURCES OF DRINKING WATER. MINNESOTA'S SAND AND GRAVEL AQUIFERS AND THE KARST AREA ARE LIKELY TO BE CONSIDERED CLASS I AQUIFERS. IT IS EPA'S STATED INTENT TO APPLY THE CLASSIFICATION SYSTEM ONLY TO PROGRAMS IT MANAGES DIRECTLY AND UNDER NO CONDITIONS IMPOSE IT ON ANY STATE. ONE AREA WHERE EPA MAY NOT BE ABLE TO AVOID IMPOSING ITS CLASSIFICATION AND CORRESPONDING GUIDELINES ON THE STATES IS UNDER THE SUPERFUND PROGRAM. STATES MAY VALUE A PARTICULAR AQUIFER MORE THAN EPA AND REQUIRE A HIGHER LEVEL OF CLEANUP THAN EPA'S GUIDANCE WOULD RECOMMEND. THERE MAY VERY WELL BE OTHER PROGRAMS WHERE THE STATES AND EPA SHARE RESPONSIBILITY AND HAVE DIFFERING PRIORITIES GUIDING THEIR PROGRAMS. TO MINIMIZE CONFLICTS, WE ENCOURAGE EPA TO COORDINATE ITS CLASSIFICATION OF AQUIFERS VERY CLOSELY WITH EACH STATE.

THE FOURTH AND FINAL PART OF EPA'S STRATEGY ADDRESSES INTERNAL MATTERS AND THE NEED TO BETTER COORDINATE ITS MANY PROGRAMS THAT INFLUENCE GROUND WATER. WE SUPPORT THAT EFFORT AND BELIEVE THAT EPA NEEDS A GROUND WATER OFFICE WITH ITS OWN STATUTORY AUTHORITY AND FUNDING.

IN SUMMARY, THE GROUND WATER IN MINNESOTA IS A UNIQUE AND UNMEASURABLY VALUABLE RESOURCE BECAUSE OF ITS CONSISTENT HIGH QUALITY AND QUANTITY. THE STATE HAS A LARGE NATURAL RESERVOIR IN ITS SYSTEM OF AQUIFERS, PROVIDING GROUND WATER WHICH IS WIDELY AVAILABLE. HOWEVER, WE MUST CONSTANTLY REMIND OURSELVES THAT IT IS NOT LIMITLESS, NOR IS IT SOMETHING WE CAN AFFORD TO HAVE DEGRADED FOR SHORT-TERM BENEFITS. NORMALLY, GROUND WATER IS NATURALLY PROTECTED FROM DIRECT "INSULTS," ALTHOUGH LAND SURFACE ACTIVITIES CAN HAVE A GREAT INFLUENCE ON THE WATER

RESOURCE. WE MUST GUARD AGAINST SELFISH USE AND MISUSE OR WE WILL LOSE FOR ALL TIME ONE OF MINNESOTA'S MOST VALUABLE NATURAL RESOURCES.

ALTHOUGH MANY GROUND WATER PROBLEMS RELATING TO QUANTITY AND QUALITY HAVE BEEN EFFECTIVELY ADDRESSED IN RECENT YEARS, THOSE THAT REMAIN ARE INCREASINGLY COMPLEX AND LESS AMENABLE TO SIMPLE, PROVEN APPROACHES. ALTHOUGH THE FOCUS OF THE CHALLENGES HAS CHANGED, HOPEFULLY THE COMMITMENT HAS NOT. BY ANTICIPATION AND PREVENTION OF FUTURE PROBLEMS RELATED TO QUANTITY AND QUALITY, A CLEAN, ADEQUATE SUPPLY OF GROUND WATER CAN BE OUR ACHIEVEMENT FOR MANY YEARS TO COME.

THANK YOU, MR. CHAIRMAN, FOR THE OPPORTUNITY TO EXPRESS OUR VIEWS ON THIS VERY IMPORTANT SUBJECT.



minnesota department of health

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January 25, 1984

The Honorable David Durenberger
United States Senate
353 Russell Senate Office Building
Washington, D.C. 20510

Dear Senator Durenberger:

Thank you for having given the Minnesota Department of Health the opportunity to present our views to you at the recent hearing in Rochester. We hope that by appearing at such hearings and attempting to influence national groundwater policy we will also be helping to safeguard the health of Minnesota's own citizens.

I would like to have this letter entered as part of the official record of the hearing of January 18, 1984, if that is permissible. This letter contains and reemphasizes some of the points which were presented orally by Dr. Valentine O'Malley, Deputy Commissioner on behalf of the Department of Health.

At this time, we have two primary concerns regarding federal involvement in drinking water quality and groundwater in particular. These are: 1) proposed House amendments to the federal Safe Drinking Water Act, and 2) the role which we feel the federal government ought to play in groundwater quality protection.

Safe Drinking Water Act: Minnesota has seven years of experience with primacy under the Safe Drinking Water Act. Through this program, the Department presently regulates 986 community public water supplies consisting of municipal-, mobile-home-park-, apartment-, and institution-type systems, serving an estimated 3.2 million of the state's 4.2 million residents. Of the systems regulated, 95% are served by groundwater, over 85% of the water systems are serving less than five thousand people. Almost 60% serve communities under 1000. We also regulate 10,500 non-community public water systems, consisting of resorts, hotels, restaurants, highway rest stops, factories, and schools, just to name a few. At some point in time, every Minnesota resident, as well as every visitor and tourist, is served by these systems.

As a result, Minnesota has had experience with a large number of small water supply systems served by groundwater, complemented by experience with the large surface water supplies of Duluth, Minneapolis, and St. Paul, as well as some small surface water supplies serving as few as 25 persons. It is from this perspective that we are suggesting that Congress consider the following three elements as it proceeds to fine-tune the Safe Drinking Water Act: flexibility, new water quality standards, and health effects research.

an equal opportunity employer

The first element is flexibility. Flexibility should be built into the monitoring requirements for contaminants to be tested and the frequency of testing. Seven years of monitoring in Minnesota under the Safe Drinking Water Act has demonstrated that some contaminants are rarely or never found. States should be given the discretion to determine the appropriate frequency of monitoring for parameters like these, within a mandated minimum schedule. Monitoring frequency should be set by each state, based on an assessment of the probability of changes in the source water, such as geologic sensitivity, land-use changes, size of distribution system, whether the source is ground or surface water, and history of occurrence of the constituent.

The second element we hope will be considered in the fine-tuning of the Act is in the area of water quality standards. Additional standards should be established for contaminants which are being found with increasing frequency in drinking water. We encourage the adoption of new standards if they are based on sound health effects research. The existing health criteria which have been developed by EPA are very useful as guidelines. But we favor adoption of standards because they are enforceable and thus carry much more weight when an agency is trying to get compliance from a utility.

For example, standards for volatile organic compounds (VOCs) should be adopted. A baseline monitoring program for 54 VOC compounds in drinking water was initiated by the Department of Health last year to survey the public water supply wells which serve approximately one-and-a-half-million Minnesotans. The monitoring program is being funded by a combination of state and federal money. After the first year of sampling in a two-and-a-half-year project, 610 wells serving 232 communities have been sampled and analyzed. Eleven wells among nine communities had VOC contamination exceeding existing health criteria guidelines. Benzene, trichloroethylene, 1,1-dichloroethylene, tetrachloroethylene and 1,2-dichloroethane are the compounds which were most commonly found. Thirty-nine wells among thirteen communities were contaminated at concentrations less than the EPA health criteria levels, but were positive for VOCs. The remaining 560 wells showed no VOC contamination.

This Health Department survey provides an excellent example of the need for the consideration of new standards and flexibility in sampling programs. More contaminated wells have been identified the first 12 months of this survey than in the past seven years of routine monitoring required under the Safe Drinking Water Act.

The third element which must be incorporated into decisions concerning the Safe Drinking Water Act is health effects research. Any new standards must be based on sound health effects data which take into account cumulative and synergistic effects when exposure to multiple contaminants is possible. Individual states simply do not have the resources necessary to conduct this research. For this reason, the Environmental Protection Agency in conjunction with other federal agencies must increase health effects research to provide a sound basis for setting new water quality standards or, at least, for recommending health advisory limits for contaminants which occur less frequently.

We have taken these elements into account in our analysis of H.R. 3200 and have reviewed it to see how it would affect the Safe Drinking Water Program in Minnesota. A major objection we have to this bill is that it specifies particular substances or contaminants. These should not be identified in the law. Rather they should be left for EPA to regulate by appropriate means, i.e., to control by more stringent measures those hazardous substances about which there are good health effects data and to regulate by other means those about which there is less certainty.

Finally, in relation to the need for state-level flexibility, the provision to allow the Environmental Protection Agency to issue administrative orders in primacy states is contrary to the spirit and intent of state primacy. Under the proposed bill, EPA could issue an administrative order to a water supply if, in the opinion of EPA, the state is not taking adequate steps to assure compliance with the Act. This direct federal intervention is destined to cause a severe strain on community-state-federal relationships. The need for EPA to take such action has not been well-documented. We feel it is totally inappropriate for EPA to be issuing administrative orders in primacy states.

Groundwater Quality Protection: From our experience with the Safe Drinking Water Act, we recognize the importance of a strong federal framework to lend support to state programs. For this reason, we would like to see the Environmental Protection Agency complete the development of its groundwater protection strategy. We hope that this strategy would then be implemented by supporting the existing efforts of states to protect their groundwater.

In Minnesota over 75% of the population relies on groundwater, and we have developed a strong program to protect that resource. The Department administers a water well construction code which operates on the premise that if wells are designed, located, constructed, maintained, and abandoned according to specific standards, not only will the system user be provided with a safe supply, but groundwater quality will be protected. The task of administering the Minnesota Water Well Construction Code is, admittedly, a big one. We estimate there are between 200,000 and 400,000 private wells in Minnesota with an additional 10,000 new wells drilled annually.

Minnesota is blessed with groundwater resources of drinking water quality throughout most of the state and we concentrate our effort on protecting that resource.

It is our view that we cannot afford to wait until the water is degraded and then try to clean it up. The federal Superfund program is helping with the cleanup of some contaminated wells, but it is not sufficient. We need to broaden our preventive measures by deterring the spread of contaminants already found. A sound well construction and monitoring program would help prevent contamination. The solutions need continuous prodding and recognition at all levels. The federal government could greatly assist Minnesota by providing support to further the development of this state's groundwater protection program.

Within the state, there are regional differences in groundwater quality and quantity which give rise to different monitoring needs. In the research report entitled "Ground Water Quality in Southeastern Minnesota," the authors concluded

The Honorable David Durenberger

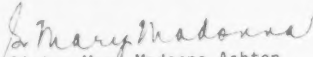
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January 25, 1984

that there was a rather urgent need to initiate a groundwater monitoring program to determine the short- and long-term trends in water quality. Such a program would provide environmental health officials with the information necessary to allow an assessment of changes in water quality in the region's aquifers and would permit rational and timely evaluation of methods for preventing further degradation in quality. Four years after the report appeared, some of that sampling has finally begun, through state, regional, and county cooperation. Unfortunately, it is a passive, reactive program which could be greatly improved if federal assistance became available.

Again, we wish to thank you for demonstrating your concern for the preservation of our water resources. We will be glad to continue working with your staff on environmental issues of public health concern. Feel free to contact my office or Dr. Raymond Thron, Director, Division of Environmental Health, if we may be of assistance in the future.

Sincerely yours,


Sister Mary Madonna Ashton
Commissioner of Health

SMMA:PMB:mrs
cc: Jim DeChaine

GEOLOGY AND GROUND WATER

Testimony by the Minnesota Geological Survey, January 18, 1984
Matt Walton, Director

The Minnesota Geological Survey is an institute within the University of Minnesota with a simple and clearly defined mission--to investigate the geology of Minnesota and make that information available and useful to its citizens. The Minnesota Geological Survey has no regulatory, administrative or policy-making functions within state government. However, we are keenly aware that if policies, regulations and programs relating to water resources are not founded on an adequate understanding of the geology of the state they cannot succeed. Therefore we feel a strong sense of responsibility for providing the geologic basis for sound water resource policies and practices, and it is from this point of view that we present our testimony.

Workable, equitable water-resource policies must be based on a couple of simple, common sense facts.

1. Ground water and surface water are inextricably connected, and one cannot be used or abused without affecting the other. This is implicit in the hydrologic cycle. Water falls to the earth as precipitation. It infiltrates into the ground where it saturates porous rock formations and becomes ground water. It seeps through permeable rock formations, called aquifers, in strict accordance with the laws of hydraulics, and it emerges in seepages and springs to provide the normal flow of streams. Ground water does not come from mysterious subterranean sources unrelated to surface drainage and precipitation, though it may be stored in porous rocks for very long periods of time or travel for considerable distances through aquifers from places where water is infiltrating or "recharging" to places where it is discharging, but if the geology is known it is possible to work out where ground water comes from and where it goes.
2. The earth is not a simple sponge of uniformly porous rock that provides ground water everywhere in more or less uniform abundance. Rock formations vary widely in their capacity to absorb and transmit water, and ground-water resources differ widely from place to place. There are obvious differences in geology, climate and topography that define broad hydrologic regions of the United States, but significant differences in hydrogeology also occur within a township or a county. Even greater differences occur from county to county, while the hydrogeology from region to region in Minnesota has great differences. This means that water resource policies and practices that work in one area may be inapplicable or irrelevant to conditions in another area. Policies on the state and national level must be broadly framed to accommodate local variations, but broad policies will be ineffective if they do not provide for obtaining the knowledge needed at the local level for practical application.

The Minnesota Geological Survey has been active at the state, regional, county, and even the local, site-specific level in providing the geologic

framework needed to understand and deal with the state's water resources. We have worked closely and harmoniously with the U.S. Geological Survey Water Resources Division, which has a regional office in St. Paul. In a general way, one might describe our respective functions by saying that we are concerned mainly with investigating and elucidating the underground plumbing system, while the U.S. Geological Survey figures out how it works for specific aquifers and watersheds and reads the water meter. We have recently completed a major set of regional hydrogeologic maps for southeastern Minnesota and the Twin Cities artesian basin, funded through a contract with the U.S. Geological Survey and the Twin Cities Metropolitan Council. On the other hand, the U.S. Geological Survey is a subcontractor to us on a project to investigate seasonal heat storage in aquifers as a means of capturing solar energy in the summer for use in the winter. Because we are part of the University and not a state agency, we do not engage in the matching fund programs between the state and the U.S. Geological Survey. Hydrologic investigations carried out under this program are under the Division of Waters of the Minnesota Department of Natural Resources. We frequently perform investigations on a contract basis with the Department of Natural Resources and the Minnesota Pollution Control Agency, and are a contractor to the Minnesota Waste Management Board in the geologic evaluation of potential sites for hazardous waste handling and disposal facilities.

During the past decade, we have made a major effort to acquire a sub-surface data base of water well drillers' logs, and we have a file of over 100,000 selected logs, which is growing at the rate of about 10,000 a year. This data base is in constant use by both public and private investigators. The large but easily polluted ground-water resource in the karst region in southeastern Minnesota has received special attention from us, aided generously by a series of grants from the Legislative Commission on Minnesota Resources. In fact, our ability to respond to needs for geologic information for water resource management has been heavily dependent on grants and contracts from other agencies and support from the Legislative Commission on Minnesota Resources. Our University budget, alone provides some matching input into suitable outside-funded projects but provides little for our own initiatives.

As our involvement with water resource-related problems and policies has developed, we have become increasingly struck with the impact of these environmental issues on counties and the key role that counties must play in the actual day to day practical dealing with these issues. Counties are repeatedly called upon to make key decisions relating to land use, waste management, water supplies, zoning and other issues at the heart of the water-resource problem. They repeatedly find that they lack the detailed, coherent information base oriented toward the counties' needs to deal with these problems, and they find it necessary to call in consultants, often at substantial expense to investigate each problem on ad hoc, site-specific basis. Seldom does this information get integrated into an information base leading to a better understanding of the county as a whole.

To us one of the most encouraging developments in the last few years has been the recognition by several counties in southeastern Minnesota of the need for systematic, scientifically accurate information on the natural endowment of the county, together with the technical guidance needed to apply that information to county problems.

In response to that need, we, on our own initiative, designed a geologic atlas for Scott County to provide a concrete example of the kinds of material we felt the county could use to address its environmental problems and educate its citizens to the need for sound policies. Upon completion of the atlas in manuscript form, the commissioners of Scott County volunteered to provide the money for publication. This has led to the development of a cooperative project with Winona County based on matching funds to produce a similar atlas, on which we are now at work. The initial steps have been taken to set up a similar project in Olmsted County. This concept of counties recognizing their needs and joining in a cooperative project on a matching fund basis to provide the fundamental information they need is, we believe, a concept that merits serious consideration for development as an aspect of a national water-resource management program.

As examples of the products that the Minnesota Geological Survey produces on a statewide, regional and county level, we are submitting with this testimony copies of small-scale versions of the state hydrogeologic maps, a regional study of the hydrogeology of southeastern Minnesota, title Paleozoical Lithostratigraphy of Southeastern Minnesota, and a copy of the Scott County Atlas. We appreciate the opportunity to submit testimony to this committee.

OUTLINE OF TESTIMONY PRESENTED ON BEHALF OF THE NORTH CENTRAL SECTION OF THE
AMERICAN WATER WORKS ASSOCIATION BEFORE THE SENATE SUBCOMMITTEE ON TOXIC SUBSTANCES
AND ENVIRONMENTAL OVERSIGHT
COMMITTEE ON ENVIRONMENT PUBLIC WORKS ON
THE SAFE DRINKING WATER ACT

January 18, 1984, Rochester, Minnesota

Senator, the North Central Section of the American Water Works Association appreciates the invitation to appear before you today to express our views on the Safe Drinking Water Program. I am Duane Prew, President of the Section, which serves the States of Minnesota and North Dakota. I am a registered Civil Engineer employed by and the President of a professional engineering and design firm located in St. Paul, Minnesota.

Nationally, the AWWA is a non-profit scientific and educational society which is the largest organization of professional water supply people in the world. The North Central Section has 700 members, the majority of which represent public water utilities located in Minnesota and North Dakota. These utilities provide potable water to the major portion of the population of the two states using both ground and surface water supplies as a source.

In the short period of time available, I will emphasize several points that should be considered when reviewing possible revisions and/or refinements to the Safe Drinking Water Act.

- * We must not lose sight of the fact that water is and has always been, a vital resource, one upon which life itself is dependent. While its quality must be monitored and protected against contamination, we must not lose sight of the fact that availability and cost must also be kept in proper perspective in order to properly serve the public need.

Those reviewing the Act, as well as those who ultimately administer the Act, must recognize that we do not live in a risk-free society. Thus, requiring treatment processes to remove those constituents found in water that have not been shown to adversely affect the public health often places an unreasonable cost burden on the consumer that is not justified by the benefits received.

* key to ensuring improvement of public water supplies is accelerated and expanded research to establish a sound scientific basis for all health standards promulgated by EPA. By significantly strengthening health-related research, the best interests of all will be served and the intent of the act will be accomplished. Concerns for compounds that may be carcinogenic should not overshadow or displace threats to health known to exist today. A strong, effective, coordinated research program will ensure that we act positively, rather than negatively, in addressing a variety of concerns.

As we gain knowledge concerning constituents in water, EPA should provide guidance on potential health effects, whether these substances should be controlled, and the level of control required. In those instances where research indicates an unacceptable risk is presented by a particular constituent, the agency should establish national maximum contaminant levels as performance standards to be applied uniformly to all public water supplies serving the people of the United States. There is no justification for discrimination by establishing different MCLs based upon a system's size, financial resources or other criteria. Further, the scientific rationale supporting standards developed pursuant to the SDWA must be coordinated and consistent with those established under the Resource Conservation and Recovery Act and the Toxic Substances Control Act.

* Water supply sources must be protected whether they be ground water or surface water.

AWWA believes the protection of groundwater is of critical importance to this nation. The Association also believes, however, that additional legislation will not provide greater protection and may in fact impede protection. What is required is vigorous control of contaminant sources under existing laws such as the Safe Drinking Water Act, the Clean Water Act, TSCA, RCRA and others. With both surface and groundwater, it simply makes more sense to remove contaminants at the point of discharge where they exist in high concentrations, rather than at the water plant intake where they are diluted to very low concentrations. As EPA exercises its authority to prohibit discharge of contaminants into the nation's source waters, the need to remove those contaminants diminishes.

In specific reference to protection of ground water, the Association has developed the following recommended policies:

- o There presently exist adequate pollution control regulations to provide for the protection of the Nation's groundwater. Pursue enforcement of these regulations, particularly with regard to hazardous and toxic waste contamination of groundwaters.
- o Reassess EPA requirements concerning land disposal of wastes, particularly with regard to contamination of groundwater resources. Economic analysis of surface water versus land disposal should consider the cost of groundwater protection and restoration.
- o Determination of the methods for protection of groundwater resources should be based on the most practical and economical combination of waste treatment disposal and water treatment available to meet public water supply requirements.
- o Develop a program, with state assistance, to inventory extent and degree of present groundwater contamination problem.
- o Develop a groundwater protection program considering analysis of inventory that will respond to the magnitude of the problem, with emphasis on state implementation.
- o Each state shall prepare an evaluation and implementation program for achievement of the goal for each of its groundwater systems. EPA shall review the state's program.

* A review of public notification procedures is recommended. We feel that the public should be notified only in instances of persistent and health-related violations of the Act. To do otherwise creates immediate overreaction when not warranted with the ultimate potential for public apathy and inaction in cases of serious contamination.

The intent of Congress to develop public awareness of drinking water problems is not being met by the current frequent notifications of minor violations of the Act. Since states have key responsibilities for provision

of safe drinking water, we believe that primacy agencies should be responsible for determining the form, manner and frequency of notifying the public that there are health-related or persistent violations.

The water supplier is responsible for providing safe water to the public. When contaminants that adversely affect health are discovered in a water supply, that information should be quickly conveyed by the utility to health officials and physicians at the state level who, by means of training and experience, can advise the utility of the appropriate method to use to notify the public.

* The potential for intentional or accidental tampering with Public Water supply systems should be addressed. We strongly support provisions making deliberate contamination of public water supplies, a federal crime. We would also support the concept of allowing utilities and individuals to bring suit for negligent contamination of drinking water, including unlawful dumping of contaminants into drinking water supply sources. However, any such provision must be reviewed carefully so as to address the status of lawful waste discharge permit holders and also whether or not utilities are exempt from suit by customers in those situations in which an unregulated contaminant is introduced into the supply without the knowledge of the utility.

* AWWA believes that National Primary Drinking Water Regulations should concern themselves with the quality of water served to consumers, not with source water, plant location or operation and maintenance. These responsibilities should rest with state and regional authorities, utility management and design engineers, not with the federal government.

Operators should have the option of choosing the best treatment technique, from those available, that will best solve their particular problem. Treatment techniques should not have to be actually installed before a supplier can qualify for a variance or exemption.

The Act currently authorizes EPA to specify treatment techniques in lieu of performance standards. We believe this authority should be limited to assure that it only applies to those contaminating substances that cannot be monitored and for which maximum contaminant levels cannot be established at an unacceptable risk level. When treatment techniques are specified, there should be assurance that health risks will be reduced; utilities should have the option, in conjunction with the primacy agency, to select appropriate treatment techniques from a list of those techniques that are generally available to remove such contaminants.

Our industry has developed technologies resulting in a number of treatment techniques. These technologies are available to primacy authorities as well as to individual utilities for selection of the best technique for a given problem in their system. To the extent feasible, performance standards, not mandatory treatment techniques, must be the goal of the federal regulatory agency. The act currently provides that standard should be "economically and technically" feasible for public water systems to attain. The Association strongly endorses this language.

- * We recommend that the Act should be amended to clearly require a federal determination that the costs of compliance with any proposed rule are justified by benefits resulting from application of the rule. While we understand that EPA conducts such analyses now, we feel that in the overall public interest, it should be stated in the law.

Creditable cost benefit analyses will ultimately reduce EPA's vulnerability to litigation and assist the industry in justifying increased rates to the public. They will put to rest the great deal of the uncertainty involved in promulgating regulations and will reduce unjustified criticism. The result is reduced regulation processing time and quicker response to real health hazards. Effective benefit-cost analysis is simply sound professional water supply engineering and management.

The Act directs agency collaboration with the scientific community in the development of revised drinking water regulations. AWWA strongly supports this concept as we believe that the National Academy of Sciences, or another independent and recognized scientific organization, should evaluate the scientific basis for regulations promulgated to protect health. The Act should recognize, however, that the establishment of contaminant levels also involves socio-economic and political considerations.

We believe that the scientific community, that is, NAS or another independent recognized scientific organization, should continue to be involved in the process of developing national drinking water regulations. Their role should be to assess the hazards of ingestion of constituents in drinking water. Using appropriate safety factors, NAS should statistically estimate the lifetime risks associated with the presence of constituents in drinking water. By integrating the scientific health risk data with socio-economic and political considerations developed through public hearings and other sources, EPA should determine the risk which is acceptable and thereby establish an MCL.

SUMMARY

Since drinking water is such a vital resource, it is important that we know what is in the water we drink and what the health effects are of those constituents found. Due to the complexity of this effort to identify constituents, the federal government must be dedicated to a program that ensures continued monitoring of source and treated water for human consumption. The federal government must also provide the resources necessary to ensure a vigorous, well-managed research program focused on health effects.

The North Central Section of the American Water Works Association believes the Safe Drinking Water Act should be amended. We support revisions to the Act that would:

- o make deliberate contamination of water supplies a federal offense;
- o strengthen the scientific basis of regulations;
- o focus EPA's regulatory efforts on those contaminants shown to present unacceptable risks to the public health; and
- o initiate the requirement that the resulting enforcement regulations be closely scrutinized on a cost-benefit basis.

Those administering the act must recognize that we do not live in a risk-free society. Thus, requiring treatment processes to remove those constituents found in water that have not been shown to adversely affect the public health often places an unreasonable cost burden on the consumer that is not justified by the benefits received.

To satisfy the intent of Congress to increase the public's sensitivity to occasional problems, we feel the act should be amended to require public notification only for health-related and persistent violations of the act. Primacy agencies, which are most familiar with the local situation, should advise the water supplier of the best method to use in notifying the public of problems with the drinking water.

We concur with EPA's need to have authority to issue administrative orders and penalties in states without primacy.

Of greater importance, however, is protection of groundwater. Vigorous control of contaminant sources, using existing laws, is essential to protect these vital source waters, as is the need for intra- and interstate compacts, encouraged if necessary by federal funding of planning and coordination efforts.

The Act should be amended to specifically authorize the EPA administrator to address both direct and indirect additives in potable water. At the same time, the purpose of EPA health advisories should be clarified to avoid the current confusion. Scientific rationale supporting regulation of contaminants should be evaluated by NAS or a similar recognized independent scientific organization; it should also be coordinated and consistent with the rationale now used to develop standards pursuant to TSCA and RCRA.

AWWA believes that EPA's authority to specify treatment techniques in lieu of performance standards should be limited by the Act to assure that it applies only to those contaminants that cannot be monitored and for which maximum contaminant levels cannot be established at an unacceptable risk level.

CONCLUSION

You will note my description of the Association's members as "professional water supply people." We share your concern for public health as evidenced by our support of this act, our assistance in the development of the interim primary drinking water regulations, our encouragement to states to assume primacy and our program of nationwide workshops to develop public awareness of the total effort. We sincerely believe that the changes that we have today recommended, will improve the act without weakening it and will result in better, safer water for the public.

We appreciate the opportunity to appear here today and I will be pleased to answer any questions.



153 Grenadier Av. N., Oakdale, Minn. 55119

IMPROVING THE SAFE DRINKING WATER ACT

Statement of Patrick Lee Reagan before
the United States Senate, Committee on
Environment and Public Works
Subcommittee on Toxic Substances and
Environmental Oversight

Hearings on the Safe Drinking Water Act
Held at Rochester, Minnesota City Hall
January 18, 1984

I. INTRODUCTION

One of the remarkable things about America's space program is the view that the Apollo missions have given us of Earth. Viewed from space it becomes quite clear that the Earth is a water planet. Two-thirds of the planet's surface is covered by water. Water is responsible for the chemistry of all forms of life. Indeed homo sapiens is over 70 percent water. Without water we could not exist.

Recognizing the importance of water to human life, it is shocking that safe drinking water is unavailable to over half of the Earth's population. Approximately two billion people in the poor nations are completely without safe drinking water and less than 15 percent of the world's population has access to a public water supply (either piped into the home or available through a public spigot within reasonable walking distance).¹ Even in advanced societies such as Mexico we are warned to be aware of the water.

What constitutes "safe" drinking water has changed over time. In the nineteenth century mosquitoes, toads, leeches and eels surrounded in the public water supply of Europe. It did not take much effort to screen out these contaminants. Infectious diseases such as typhoid fever, dysentery, cholera were quite common as well. Chlorination was a public health breakthrough early in the twentieth century and resulted in major reductions in the incidence of infectious disease in the United States.² Ironically, the cure itself is now suspect. Moreover, the toxic problem is not confined to chloroform, but includes heavy metals, pesticides, organic compounds, and other exotic chemicals.³ Some have argued that the biggest problem is the evergrowing and as yet unmanaged production and disposal of waste products. The affect of waste production on the quality of the nation's water supplies is one of the manifestations of the all-pervasive problem of waste disposal.⁴

From a general perspective the following points are of some importance in drinking water policy:

1. It is very difficult to control the quality of drinking water by only establishing standards and permissible concentrations. The specific problems of safe drinking water are so complex that to only set standards would still result in some water supplies still being unsafe.
2. Since it will be impossible to obtain adequate information to set standards to protect human health for all components within the water, standards will always be limited and will often come too late.
3. It is far more important and helpful to approach the problem of drinking water quality with the view that all human beings have a right to "natural and pure drinking water".
4. This guideline can be used to establish policy on suitable treatment processes and the discharge of point and non-point sources of waste products from industrial processes or the ecologically altering activities of man (mining, agriculture, etc.).
5. While there are still many questions which cannot, as yet, be answered if "natural pure water" is to be made available for drinking, we must, nevertheless, consider broader solutions to the problem than the fragmented shell-game than exists within federal and state law.

This broader approach to the protection of pure and natural drinking water can be illustrated by examining the issues of toxic substances in drinking water, and the protection of ground water. This testimony will, then, focus on these two issues as well as specific problems with the existing Safe Drinking Water Act. (___U.S.C. S 1401 et seq., as amended).

II. TOXIC SUBSTANCES IN DRINKING WATER

The water supply industry accounts for an annual expenditure of nearly \$6 billion involving over 240,000 public water supply systems. 58 percent of the 40,000 community water suppliers are publicly owned and supply 88 percent of the total U.S. drinking water. Most of the 200,000 public, non-community water systems are privately owned and service most of the remaining 12 percent of the population.⁵ The most prevalent treatment processes used by these systems are for the control of bacteriological contamination and turbidity.⁶

The issue of toxic substances in drinking water is probably the most difficult and complex problem faced by water suppliers today. Of all the substances found in drinking water, toxic organic chemicals have received the most attention. This is because many of these compounds once thought safe are now found to present substantial risks to human health in the parts per billion and parts per trillion range (ex., 2,3,7,8-TCDD has caused cancer in laboratory animals at 2 parts per trillion).⁷ Many of these compounds are tasteless and odorless and cannot be tested without sensitive analytical instrumentation.

Surveys by the Environmental Protection Agency (EPA) and analyses by the National Academy of Sciences (NAS) identify a number of concerns about the toxic organic chemical problem in drinking water:

1. The NAS studies have shown that only a few toxic organic substances have been identified (see table); over 90 percent of the total organic content of drinking water by weight has not yet been identified. (8)
2. The National Organic Reconnaissance Survey found that THM (trihalomethanes) are usually higher in drinking water derived from chlorinated surface water than in drinking water derived from chlorinated ground water (Surface waters tend to have higher concentrations of natural organic compounds that react with chlorine to form THMs and other compounds). (9)

Chlorinated surface waters has been associated with increased risks of gastrointestinal and urinary tract cancers.

Table 1

Selected Synthetic Organic Chemicals Detected in Drinking Water Wells

Chemical	Evidence for carcinogenicity
Benzene	H
alpha-BHC	CA
beta-BHC	NTA
gamma-BHC (Lindane)	CA
Bis (2-ethylhexyl) phthalate	NTA
Bromoform	NTA
Butyl benzyl phthalate	NTA
Carbon tetrachloride	CA
Chloroform	CA
Chloromethane	NTA
Cyclohexane	NTA
Dibromochloropropane (DBCP)	CA
Dibromochloromethane	NTA
1,1-Dichloroethane	SA
1,2-Dichloroethane	CA
1,1-Dichloroethylene	NTA
1,2-Dichloroethylene	NTA
Di-n-butyl phthalate	NTA
Dioxane	CA
Ethylene dibromide (EDB)	CA
Isopropyl benzene	NTA
Methylene chloride	NTA
Parathion	SA
Tetrachloroethylene	CA
Toluene	NTA
1,1,1-Trichloroethane	NA
1,1,2-Trichloroethane	CA
Trichloroethylene (TCE)	CA
Trifluorotrichloroethane	NTA
Vinyl chloride	H, CA
Xylene	NTA

H = Confirmed human carcinogen.

CA = Confirmed animal carcinogen.

SA = Suggested animal carcinogen.

NA = Negative evidence of carcinogenicity from animal bioassay.

NTA = Not tested in animal bioassay.

Source: Adapted from Kenny S. Crump and Harry A. Guess, Drinking Water and Cancer: Review of Recent Findings and Assessment of Risks, prepared for the Council on Environmental Quality by Science Research Systems, Inc. (Springfield, Va.: National Technical Information Service, 1980), pp. 48-49.

3. Epidemiological evidence has only limited usefulness in evaluating the threat from toxic organic substances. In essence, epidemiological studies (i.e., population based studies) only measure high incidences of relatively rare effects. In addition, this type of study has limited usefulness because of confounding variables (nutrition, age, smoking, occupation, etc.). At best, they confirm, but cannot generally disprove animal models showing causality between a substance and a biological effect. Hence, health risk assessments, as attempted by the NAS, are made without adequate data and are fraught with the potential for misuse. (10)

The crux of the toxic drinking water problem is how chemical carcinogens are handled. With cancer there is a latency problem (the cancer may not manifest itself for up to 15 to 40 years after exposure). An additional problem is of potential synergism with other agents which multiply the toxic action of the original substances. While a complete analysis of public policy for handling chemical carcinogens is beyond the scope of this paper, the following guidelines should be reflected in all federal laws including the Safe Drinking Water Act:

1. Operate on the valid assumption that animal carcinogens are human carcinogens. (11)
2. Recognize that there are no known safe limits for a chemical carcinogen. (12)
3. Recognize that chemicals can interact synergistically to enhance the effects of each other.
4. Acknowledge that the entire population, including sensitive portions thereof, deserve protection.
5. Require mandatory technology that either eliminates exposure to the substance by the best practical means and/or prevents exposures by prohibiting practices which allow exposure to take place.
6. Monitor both regulated and unregulated substances on a frequent basis so that the extent of the problem can be identified.
7. In general, do something before exposure takes place rather than react after-the-fact with the shell-game of federal laws ostensibly designed to protect health. In short, reduce cancer causing chemicals in the drinking water. (13)

III. PROTECTION OF GROUND WATERS

Ground water resources from wells and springs are used by nearly half the U.S. population as a primary source of drinking water.¹⁴ 36 percent of municipal public drinking water and 75 percent of major U.S. cities depend on ground water for most of their supply.¹⁵ In 1950 ground water use totaled 30 to 35 billion gallons per day (BGD).¹⁶ By 1980 total estimated ground water withdrawals were estimated at 88.5 BGD of which two-thirds (59 BGD) were used for irrigating agricultural land.¹⁷

Ground water has generally been thought of as a pure and natural source of drinking water. However recent information shows that ground water in many locations is contaminated by toxic chemicals and/or biological toxins.¹⁸ Ground water is particularly vulnerable to toxic contamination because normal filtration and absorption mechanisms naturally present do not remove for example, chlorinated hydrocarbons.

Contamination of ground water from human activity includes point discharges, waste disposal practices and non-point sources. The many sources associated with waste disposal include surface impoundments, landfills, and hazardous waste sites. Non-point sources include agriculture, mining, silviculture, land spreading of sludge, deep well disposal of liquid wastes, use of deicing salts, construction activities, etc.¹⁹

There does not yet exist, a specific federal program to deal with contamination of ground water. Several federal laws do address portions of the problem and others indirectly touch on the issue:

1. RCRA (Resource Conservation and Recovery Act) establishes guidelines for the disposal solid and hazardous waste.
2. The Safe Drinking Water Act does provide for a program of underwater injection control to protect sole source drinking water aquifers.

3. The Comprehensive Environmental Response, Compensation and Liability Act (Superfund) requires the federal government to clean up spills and waste disposal sites which threaten ground water.
4. The Clean Water Act requires EPA to have water quality surveillance system which includes ground water.
5. The Toxic Substances Control Act (ToSCA) and the Surface Mining Control and Reclamation Act both contain provisions which offer some protection to ground water.

Overall, these laws have not been very effective in controlling and preventing ground water contamination.

In 1980 the Environmental Protection Agency (EPA) did propose a national ground water strategy.²⁰ Its goal was to prevent ground water contamination as opposed to remedial action. A number of points from that strategy should be supported:

1. There is a clear need for a national strategy for long-range ground water protection, to be implemented both by the federal government and by the states.
2. A preventative approach is essential to protect our renewable ground water resources for future generations.
3. The overriding concern of ground water protection efforts must be protection of public health and sensitive ecological areas.
4. State ground water protection strategies must be consistent in terms of classification categories and processes for classification.
5. Federal and state level efforts to protect ground water must be coordinated.
6. There must be extensive public involvement and participation in the development and implementation of ground water protection programs through formal processes.
7. Data gathering on ground water quality and the development of analytical tools must be high priorities along with attention to pressing ground water contamination problems.
8. Technical requirements such as effluent standards and best management practices must be used now; protection efforts cannot wait for the development of ground water quality standards.

Today the EPA is revising its ground water policy. In addition to the eight points noted above, it is hoped that the new strategy will address four other critical areas:

1. The establishment of the principle of nondegradation of pristine and quality drinking water ground water. The notion contained within the strategy of allowing a lower classification where justified should be deleted. It is impossible to predict future drinking water needs and the potential for errors is too great to allow anything but the most conservative policy for ground water.
2. The elimination of continued ground water contamination. The classification scheme within the 1980 proposed strategy would allow, even in the highest degree of protection category, the continuation of contaminating activities. The continued contamination of ground water is not acceptable everywhere and cannot be universally applied. A better approach would be a policy eliminating contamination of all ground water as soon as possible.
3. The EPA needs to seek new legislative authority to require states to adopt "best management practices" for those human activities which contaminate ground water including agriculture silviculture, mining, construction activities, the use of deicing salts, waste disposal practices, etc. (An example of a "best management practice" for the use of deicing salts is attached. If made mandatory, significant reductions in the contamination of surface and ground water by deicing salts could occur, mostly due to reasonable reduction in the use of deicing salts.)
4. The strategy should contain a clear definition of what is "drinking water quality". If it is to be defined by the compliance with drinking water standards, then it is quite clear that the majority of underground drinking water sources are certain to be degraded. The existing standards, even if supplemented by the additional recommendations of the NAS, would be woefully inadequate to protect drinking water from toxic substances.

IV. RECOMMENDATIONS FOR AMENDING THE SAFE DRINKING WATER ACT

On November 15, 1973 the Comptroller General issued a report to the Congress entitled Improved Federal and State Programs Needed to Insure the Purity and Safety of Drinking Water in the United States.²¹ As a result of this and many other reports, Congress passed the Safe Drinking Water Act of 1974, which was signed into law on December 17. Since then, the Safe Drinking Water Act has been amended twice (PL 95-190, November 16, 1977 and PL 96-63, September 6, 1979).

Now committees of Congress are again interested in amending this law. Congressman Eckart has introduced H.R. 3200 in order to insure the prompt enforcement of drinking water regulations and to provide greater protection for underground sources of drinking water. After reviewing the law, we in Clear Air, Clear Water, Unlimited feel that the Safe Drinking Water Act should be amended in six different areas: 1.) standard setting, 2.) treatment technology, 3.) monitoring, 4.) economics, 5.) technical assistance, and 6.) groundwater protection.

1. Standard Setting.

Too often compliance with existing drinking water standards is used as a basis and argument that drinking water is safe. Only a handful of "maximum containment levels" have been promulgated under the act. Standards for the chloro-organic compounds and heavy metals are practically nonexistent. There are over 700 organic contaminants in surface waters. The EPA needs to have deadlines imposed upon it to insure that additional standards that need to be promulgated will be promulgated. A limit of three years to promulgate standards on the "priority list" seems a reasonable length of time.

One issue that comes to the front in the development of standards at every federal agency is what do we do about chemical carcinogens. The National Cancer Advisory Board has stated that "[demonstration that a

compound is carcinogenic in animals should, therefore, be considered evidence that it is likely to be carcinogenic in humans, unless there is strong evidence in humans to the contrary".²² In addition, the Surgeon General has stated that "No level of exposure to a chemical carcinogen should be considered toxicologically insignificant for man. For carcinogenic agents, a 'safe level for man' cannot be established by application of our present knowledge".²³ These two statements provide the basic policy embodied in the Delany clause of the Food, Drug, and Cosmetic Act. It is a basis that should be used as policy in all our public health laws including the Safe Drinking Water Act.

2. Treatment Technology.

With the focus of the Safe Drinking Water Act on the development of standards and the already significant contamination of drinking water by toxic organic compounds, the burden of risk is on the water-drinking public. The law ought to require the use of the "best available treatment technology" as the Clean Water Act presently does for point source dischargers (e.g., granular activated carbon (GAC) filtration to remove these toxic organic compounds). We cannot wait decades while the government drags its feet trying to determine what are the safe levels, if any, for those substances, treatment technology is needed now. More than 30 European cities use GAC technology economically and we can also.

3. Monitoring.

It is clear that mounting pollution problems require increased attention on the quality of our drinking waters. The use of drinking water which does not pose a threat to consumers depends on continuous protection. As the EPA noted in its Statement of Basis and Purpose for the National Interim Primary Drinking Water Regulations, the "delivery of safe water supply depends on adequate protection. . . and routine analysis of water samples and frequent survey of the water

system. . .²⁴(emphasis not added). At present, water suppliers are only required to monitor drinking water for those contaminants for which there are standards. If water suppliers do not look for non-standard contaminants, the public could be exposed to dangerous chemicals out of ignorance or misfeasance. The Safe Drinking Water Act should be amended to require periodic monitoring for commonly used industrial chemicals and pesticides. Each system should have a baseline for the quality of its water, with monitoring requirements adjusted according to what is found, not just what is regulated. Comprehensive testing is a necessity to protect the public. Ignorance, as an issue in drinking water quality, must be eliminated.

4. Economics.

Who should pay for the cost of treatment technologies to clean up contaminated water? This is perhaps the key political question that needs to be addressed if drinking water quality is to be improved. The current administration appears to reject financing of environmental and public health programs, when compared to its predecessors. Should the consumers who are already taking the risks pay directly for a problem they did not create? Perhaps the industries which generated the waste and which receive the benefits of their sloppy practices should finance the cleanup of the drinking water. A chemical user fee could be assessed to companies which manufacture chemicals, use chemicals in its process or disposes of chemicals. These fees could go to a dedicated fund, similar to unemployment compensation, which then could be used to pay for the "best available treatment technology" needed to remove chemicals from a drinking water supply.

5. Technical Assistance.

One issue identified in the 1973 Comptroller General Report noted above was the need to insure that treatment plant operators were qualified and adequately trained.²⁵ On March 3, 1982 the Comptroller General issued a new report entitled States' Compliance Lacking in Meeting Safe Drinking Water Regulations. The report found that:

- many small community public water system supplies are not meeting the drinking water quality standards and are not testing as required by Federal regulation and
- as defined in the act, the effectiveness of the public notification process in informing drinking water users of violations is questionable. . .

We believe that a combination of factors including the lack of full-time and properly trained water system operators, water system operator apathy, failure of states to perform water sampling activities, and insufficient state resources -- funds and personnel -- are the primary factors causing these problems.(26)

It would be helpful, therefore, if the federal government could provide money to the states and require them to establish technical assistance programs to assist smaller water systems to comply with the act.

6. Groundwater Protection.

A review of the groundwater protection issue was provided in Section III above. Specific recommendations to the Safe Drinking Water Act to protect groundwater should include 1.) a non-degradation policy; 2.) a requirement to stop the discharge of contaminants into the ground water by adopting "best management practices", irrespective if the pollutant is a regulated substance or not; and, 3.) a policy statement which provides that people have a right to natural and pure drinking water.

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STATEMENT OF

PEGGY LADNER

FOR

CLEAN WATER ACTION PROJECT

BEFORE THE

SENATE COMMITTEE ON ENVIRONMENT

AND PUBLIC WORKS

AND THE

SUBCOMMITTEE ON TOXIC SUBSTANCES AND ENVIRONMENTAL OVERSIGHT

ON THE SAFE DRINKING WATER ACT

JANUARY 18, 1984

Senators, my name is Peggy Ladner, Midwest Director for Clean Water Action Project. Our organization has worked to prevent and clean-up drinking water contamination for the past twelve years. We are a national organization with several state offices around the country. We appreciate the opportunity to comment on the Safe Drinking Water Act as you prepare to amend this important law.

When Congress passed the Safe Drinking Water Act in 1974, it gave the Environmental Protection Agency (EPA) the authority to protect public health by setting safety standards for contaminants which could have an adverse effect on human health. Congress said, in effect, that the EPA should take action to protect public health rather than wait for conclusive evidence that a contaminant found in drinking water is dangerous. Ten years after passage of the law there is much more evidence to support the preventive approach which Congress initially prescribed. Despite this mandate, the EPA has done very little to implement the law.

- > hundreds of synthetic organic chemicals have been identified in treated drinking water throughout the nation yet no standards have been set for them
- > no monitoring is required for the vast number of unregulated contaminants
- > there is no comprehensive strategy for the protection of groundwater even though 50% of all U.S. citizens--and nearly 75% of all Minnesotans--get their drinking water from groundwater.
- > the burden for cleaning up contaminated drinking water in almost all cases falls upon the consumer not the polluter.

Minnesota can be held up as a model state compared to most of the country because of a state groundwater monitoring program begun last summer and testing

for volatile organics which started in 1982. Despite the generally high quality of drinking water across the state, Minnesotans have been shocked with the news of drinking water contamination found at New Brighton, Oakdale, Le Hillier and Long Prairie, Minnesota. At Long Prairie tetrachloroethylene was found at 920 ppb when the recommended level is only 8 ppb.

Clean Water Action Project's staff reached over 200,000 residents of Minnesota in 1983 to discuss water pollution issues and the Project's activities. The public is concerned about the effects of toxic waste dumps and spills on their drinking water. Concerned residents frequently ask the Project's staff where drinking water can be taken to be tested. The public expects Congress to take the necessary action to protect their tap water. This year Congress should correct the failures of the Safe Drinking Water Act and EPA's inertia to implement the law.

The following improvements would strengthen the law significantly:

STANDARD SETTING

EPA has issued Maximum Contaminant Levels for fewer than two dozen contaminants despite the fact that over 700 organic contaminants were detected in treated drinking water in the mid-1970s, according to an EPA Survey. The National Groundwater Supply Survey, released in January 1983, found organic chemicals in 28% of the 950 wells tested at random. Given the pervasiveness of organic chemicals in drinking water, it is unacceptable that EPA has not set standards for commonly found industrial chemicals and pesticides. Standard setting is clearly a federal role since there is no evidence that chemicals like TCE affect Iowans differently than they affect Minnesotans. The standard-setting process should be expedited, and EPA should be given strict deadlines for establishing standards for the most common contaminants.

MONITORING

At this time, water suppliers are only required to test their drinking water for those contaminants for which standards have been set. The lack of monitoring for unregulated contaminants means that the public can be exposed to potentially dangerous chemicals in drinking water long before they are detected. Clean Water Action Project surveyed all the states and found that only eight had routine programs for monitoring synthetic organic chemicals in drinking water. Minnesota is one of the few states which has begun to test for volatile organics in conjunction with normal water sampling tests. Results of the Minnesota testing show the following compounds are being found in some drinking water across the state: trichloroethylene (TCE), tetrachloroethylene, nonhalogenated organic compounds, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, 1,2-dichloroethane, 1,1-dichloroethylene, 1,1-dichloroethane.

Congress should change the law to require water suppliers to monitor their drinking water for the most commonly used industrial chemicals and pesticides. Comprehensive testing of every water system will establish a baseline for the quality of water for which annual monitoring requirements can be determined. This information should be made available to the public in their water bills and to the media.

TECHNOLOGY-BASED DRINKING WATER TREATMENT STANDARDS

Setting individual Maximum Contaminant Levels for all of the substances found in drinking water will be an enormous, costly task. Based on the history of the program to date, EPA is unlikely to promulgate an adequate number of standards to protect public health in the near future. Furthermore, the scientific validity of the standards themselves is open to question. Is a safe level for chloroform in drinking water 100 parts per billion (the standard set by EPA), or is it 25 parts per billion (the standard most European countries have established)? Conclusive information on human health effects of exposure to low concentration of toxic substances in drinking water is elusive.

When Congress grappled with similar regulatory problems in the context of the Clean Water Act and Clean Air Act, it resolved to take a technology-based approach. In the case of the Clean Water Act, rather than attempt to make case-by-case pollution control decisions based on the effect of a discharge into a particular body of water, Congress required all discharges to meet economically achievable, technology-based standards. As a result, the pollution control guessing game that preceded the enactment of the Clean Water Act was replaced by effective, national uniform cleanup requirements. And technology-based requirements have met the test of time; a decade after passage of the Clean Water Act, our lakes and rivers are markedly cleaner.

Congress should take a similar approach with the Safe Drinking Water Act by expanding the provision of current law that allows the EPA to require the use of treatment technologies. Currently, the EPA may require the use of a treatment technique only when monitoring for a substance is not technologically and economically feasible. Instead, we urge that the statute be changed to permit the Administrator to use this authority whenever use of a treatment

technique would better serve the public health than establishing Maximum Contaminant Levels. Furthermore, we believe that whenever synthetic organic chemicals are detected in a public water system, the water supplier should be required to install the best available treatment technology economically achievable (as defined by EPA) to reduce the level of these contaminants to the extent feasible.

Affordable treatment technologies capable of significantly reducing the concentration of many organic chemical compounds are available. One such technology, granular activated carbon filtration, is used in more than thirty major Western European technologies. If they can do it in Europe, why not in the United States?

Providing Potable Water and Allocating Cleanup Costs

There are a growing number of water contamination victims across the country. Here in Minnesota the trials of seven New Brighton families who were told not to drink their water because of contamination from the Army's Twin Cities arsenal illustrates the problem well. For two years these families were left to haul water to their homes. Four of the families were warned not to use their water for any purpose and, therefore, relied on neighbors and friends for bathing facilities. One of the victims spent \$4,000 to hook up to the city water and has yet to be reimbursed by the Army or any state or federal agency. The Army began delivering bottled water to the families with contaminated wells two years after they were told to stop drinking their water.

What occurred in New Brighton is, unfortunately, all too typical of what happens to people around the country when their drinking water is contaminated. The value of their homes plummets; they must often do without potable water for extended periods of time; and fear of long-term health effects causes mental and emotional anguish. Environmental statutes and the legal system

have proved unable to provide remedies to those whose water has been contaminated.

In amending the Safe Drinking Water Act, Congress should provide mechanisms to alleviate the short-term suffering and inconvenience caused by incidents of drinking water contamination. In addition, Congress should act to ensure equity: those who pollute drinking water supplies should be responsible for paying the costs citizens and water utilities incur for removing contaminants.

Administrative Orders to Supply Potable Water

It is essential that people be provided with potable water when their drinking water is contaminated. People should not be forced to do without safe drinking water, as the citizens of New Brighton were, for extended periods of time.

Congress should require the states to enact legislation authorizing the state health department to issue administrative orders to compel those responsible for causing or contributing to drinking water contamination to provide potable water to the affected consumers. State statutes should include, of course, procedures for appealing the orders, but the recipient of the order should provide potable water during the appeal process. If the order is overturned, then the state can reimburse the recipient for the costs incurred. The state programs should also include a procedure for allowing citizens or water utilities to petition the state to issue water supply orders and a deadline for the state to respond. Enacting such legislation at the state level should be a condition of the state primacy.

Civil Suits

When drinking water is contaminated, consumers and water utilities--not those responsible for causing the contamination--must pay the costs of upgrading the treatment system. To remedy this inequitable situation, Congress should allow citizens, water suppliers and third parties to sue in federal court

those responsible for contaminating drinking water supplies to recover the costs incurred by removing contaminants or developing an alternative source of drinking water.

Creating a private right of action will have an extremely beneficial effect on the quality of drinking water; it will provide an incentive to polluters to reduce the volume and toxicity of their waste discharges, improve the efficiency of their manufacture processes, and promote greater care in handling and managing process chemicals and wastes.

TECHNICAL ASSISTANCE FOR SMALL COMMUNITIES

Many small communities cannot comply with the inadequate standards of the current Safe Drinking Water Act because they are without trained staff to manage the community water system. In addition, they are oftentimes unable to collect in user fees sufficient funds to maintain the system and provide for future maintenance and replacement. Therefore, the federal government should provide money to the states and require them to set up technical assistance programs to help smaller water systems come into compliance. States might employ regional specialists who could travel from community to community teaching operators of water systems various skills necessary to meet the standards of the Safe Drinking Water Act.

GROUNDWATER PROTECTION

As with all pollution problems, prevention is an easier and less costly solution than clean-up once contamination occurs. Groundwater contamination is largely a function of land use in aquifer recharge zones. When hazardous waste disposal, pesticide use, road de-icing or other polluting activities occur in the areas that recharge the aquifer, contamination results. If states which derive a significant portion of their drinking water from groundwater

were required to develop and implement a groundwater protection plan, money could be saved and public health protected.

The process for states to develop and implement groundwater protection plans could work as follows:

- 1) States identify critical recharge zones and activities which may be adversely affecting underground sources of drinking water and economically affordable management practices to protect significant sources of groundwater by category of activity and source of contamination.
- 2) States submit plan to the Administrator of EPA for approval by a certain date.
- 3) States begin implementation of management practices and prevention measures within critical aquifer recharge zones by a certain date.
The Federal Government should split the cost of developing the plan and administering its implementation.
- 4) Should any state required to submit a plan fail to do so or fail to implement one after it is developed, the EPA should do it.

One serious national problem which the Congress should address immediately through either the Safe Drinking Water Act or the Resource Conservation and Recovery Act is leaking underground gasoline storage tanks. EPA estimates that as many as 100,000 such tanks are leaking up to 11,000,000 gallons into groundwater annually. Strict requirements for storage tank design and close monitoring of the underground tanks should be required. As leaking tanks are discovered, they should be replaced with tanks meeting improved design specifications.

As this committee drafts amendments to improve the Safe Drinking Water Act, it will hear complaints about the high cost of increased testing, upgraded treatment systems and more frequent monitoring. Experience in Western Europe

where more than thirty drinking water treatment plants are now using granular activated carbon for chemical removal show that drinking water treatment represents only ten to twenty percent of the total cost of water delivery. From this perspective, the cost of treatment should not be an overriding factor. The fact is water is an underpriced commodity compared to so many other consumer goods for which the public is not dependent for life itself. Residents of Rochester, Minnesota are charged a flat rate of \$12 for 30,000 gallons (the amount typically used by a family of four in three months). In 1977-78 the average cost in the state was \$17 for 30,000 gallons. Many cities in Minnesota charge less as more water is consumed. No place in Minnesota charges more per block usage of water. Localities who are concerned about higher costs of water treatment could consider changing their rate structure to an increasing block rate. This would encourage water conservation and raise revenues for better treatment.

Public opinion polls consistently favor safer drinking water. One billion dollars spent annually on home water treatment equipment and 600 million gallons of bottled water sales each year also indicate the public wants stronger safe drinking water protections. Clean Water Action Project urges this committee to draft a stronger law and to put the funding behind it to assure its successful implementation.

the minnesota project

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January 9, 1984

Senator David Durenburger
Chair of Toxic Substances and Environmental Oversight Subcommittee
U.S. Senate
408 Hart Building
Washington, D.C. 20510

Dear Senator Durenburger:

I have been informed that you are holding hearings on the Safe Drinking Water Act and I thought you might be interested in some of our work on groundwater quality. Please include this statement in the record.

For the past year, the Minnesota Project has been conducting a major project on groundwater quality in the karst area of southeastern Minnesota. Karst is a geological formation of porous limestone which allows groundwater to flow freely along the numerous cracks, caves, and fissures. Karst areas are extremely sensitive to pollution from surface activities, and indeed our groundwater is substantially contaminated already. Karst areas make up something like 20% of the U.S., so this is not simply a local problem.

While single sources of pollution are often identified as a problem, such as the much-publicized hazardous waste illegally buried at the Ironwood Landfill near Spring Valley, Mn., we are finding that non-point sources are the primary sources of groundwater pollution in karst areas. You see, the normal filtering process is absent in karst areas, so essentially any pollution that reaches surface water will eventually flow into groundwater, and will then quickly flow many miles underground. Improper septic systems, feedlots, dumping in sinkholes, and runoff of agriculture chemicals and fertilizers are the everyday activities which are polluting our groundwater here in southeast Minnesota.

I would like to make three points regarding the Safe Drinking Water Act. First, non-point sources of pollution have a primary impact on groundwater in karst areas. Traditionally, non-point sources are thought of only in relation to surface water. But the only way to protect our drinking water here is to control soil erosion and agricultural runoff. If it's getting into surface water, it's getting into our drinking water. To the extent that more funding and more support can be funneled to the control of non-point sources, the better our water will be.

My second point relates to testing of local water supplies. It isn't frequent enough, and it doesn't test for enough substances. In a karst area, quarterly testing is going to miss big slugs of pollution that may flow through after the spring melt or major erosive rainstorms. While daily testing may not be feasible, weekly testing should possibly be required.

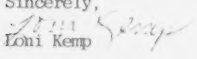
Also, I don't think the existing tests are looking for today's generation of agriculture chemicals. Frequent tests should be made for Atrazine, Lasso, Roundup, Bladex, Dual, and the products most frequently applied in any given region. Studies by the Iowa Geological Survey in their adjacent karst area are revealing significant amounts of these chemicals in the groundwater. Are safe drinking standards even available for these chemicals? If not, they must be developed.

A third point relates to private water supplies, which are not even covered by this act. Who will ever know when the thousands of private wells become polluted? Landowners often don't know that it is their responsibility to check their own water, or how to do it. Yet thousands of rural people and millions of livestock drink this water every day. Some kind of monitoring or testing must be undertaken before health is affected.

We are now in the second year of our groundwater public education project. In addition to developing a wide variety of materials to be used in educating people about karst, we are also developing a model groundwater protection ordinance for counties to adopt. We realize that the federal and state governments can't solve this problem alone.

Please feel free to have your staff contact me if you have questions about our work in the area of groundwater. Good luck in your efforts to improve the Safe Drinking Water Act.

Sincerely,


Loui Kemp

STATEMENT OF

GERALD S. ALLEN, P.E., PRESIDENT
SERCO LABORATORIES

before the

SUBCOMMITTEE ON TOXIC SUBSTANCES AND
ENVIRONMENTAL OVERSIGHT
UNITED STATES SENATE

on

SAFE DRINKING WATER ACT
JANUARY 18, 1984

My name is Gerald S. Allen. I am president and owner of SERCO Laboratories (Sanitary Engineering Laboratories, Inc.) with laboratory facilities located in St. Paul, Minnesota, and Cedar Falls, Iowa. SERCO was founded in 1964, 20 years ago. SERCO's staff of engineers (chemical and civil), chemists, biologists, and technicians provide laboratory analysis and related consulting services to industry, municipalities, engineering firms, health care providers, and government agencies. Our laboratories provide a broad range of analytical services to the water supply industry and since its implementation have been actively involved in providing monitoring and related consulting services to these clients related to the Safe Drinking Water Act in the upper midwest and particularly in Minnesota and Iowa.

Today I am speaking as a representative of the American Council of Independent Laboratories (ACIL), an organization consisting of over 250 independently owned small business firms located throughout the United States. These firms provide services to industry and other businesses, all levels of government, individual citizens, and groups of individual citizens. The groups served include the regulators, the suppliers, and the consumers of public drinking water. ACIL was established in 1937 and is a professional association of independent engineering and scientific laboratories dedicated to promote professional and ethical practices in an environment of private business enterprise for the public welfare. An independent laboratory is a non-tax favored business unaffiliated with any academic or governmental institution or any outside industrial company or trade group in any manner which might affect its ability to conduct investigations, render reports, or give professional counsel objectively and without bias.

ACIL strongly recommends that the intent of the Federal OMB Circular A-76 related to the use of the private sector by government for needed goods and services be considered when amendments to the Safe Drinking Water Act are developed. In the spirit of the free enterprise system, independent laboratories, particularly ACIL member firms, stand ready with our available resources (staff and facilities) to assist and serve all levels of government in the implementation of this Act.

I represent the Council as Vice-Chairman of the Central Division and as a member of the Public Relations Committee and the Chemical and Biological Testing Committee. I am a graduate in Civil Engineering from the University of Minnesota, specializing in Environmental Engineering and am a registered Professional Engineer in the states of Iowa, Minnesota, and Wisconsin. I have membership in numerous professional and technical associations and groups as well.

ACIL and its member firms strongly support the need to insure that a safe drinking water supply is available to the public throughout our country. We also are mutually concerned with the potential for contamination of our water supplies, particularly ground water supplies, by various man-made chemicals and materials. We urge Congress to support the Safe Drinking Act and to upgrade it in such a way that it can effectively and intelligently be used to continue to safeguard and improve the safety of water supply throughout the country.

Today, as a representative of the American Council of Independent Laboratories, I would like to offer comments regarding the current Safe Drinking Water Act as well as future recommendations for this legislation but limit my comments to monitoring. Member firms of the Council serve a broad range of water supply systems. SERCO, for example, serves the Cities of St. Paul and Minneapolis as well as several smaller systems located in Iowa and Minnesota. Today, however, I limit my remarks only to the smaller public water supply systems. I will also offer specific information regarding the cost of this monitoring.

SMALL SYSTEM CHARACTERISTICS

In general, the smaller systems use ground water as the water supply source. The complexities of the smaller system, particularly if treatment is provided, can be comparable in complexity to the supply and treatment systems serving larger communities. Typically, however, the operating personnel available to the smaller water supply system, even though committed and dedicated to providing a safe water supply, often have a limited background in water treatment and distribution. They also frequently have a broad range of responsibilities other than the operation of the water supply system and perhaps have less time to deal with the complexities of providing a safe water supply. The smaller systems also have a similarly smaller operating budget, with limited funds available for monitoring.

Small water supply systems may serve a significant transient population, relative to the connected population depending upon its location to a much greater proportion than a similarly located larger water supply system. With these points in mind then, it would be important to develop a Safe Drinking Water Strategy, whether through legislation or regulation that will not only address the concerns and impact of safe water for the large metropolitan communities, but also for the smaller systems serving a smaller population to the maximum practical degree possible.

MONITORING

The objective of monitoring a product, in this case drinking water, is to insure that a high standard of quality is maintained. The ultimate quality control program would sample and analyze all of the product to insure that it meets the established standards. This is obviously unrealistic in that no water would be available for use. Therefore, a reasonable quality control monitoring program should be implemented based upon conditions that economically provide for a reasonable assurance that the quality is maintained. Regular monitoring for constituents on a routine basis in a water system may vary depending upon the type of treatment provided but normally will include microbiological testing, chlorine analysis, turbidity analysis, and other similar operation related analyses. Potential contaminants that may be contained in the water supply source will normally not vary except over long periods of

time and will require less frequent monitoring. The provision for variation in the frequency of monitoring has been provided for in the regulations prepared as required by the Safe Drinking Water Act.

Based upon health effects research and other available health information, the U. S. EPA has prepared a list of contaminants to be regulated under the Safe Drinking Water Act (Primary Standards). As health effects research and scientific data become available, it is my understanding that certain contaminants may be added or removed from this regulated list. Based upon good quality control practice, this approach in dealing with potential contaminants for drinking water seems reasonable. The U. S. EPA has considered a 3-tier approach which will provide for certain regulated contaminants that must be consistently monitored and reported nation-wide, for other regulated contaminants more local in nature that could be monitored on a more flexible basis and for the unregulated contaminants that could be dealt with through health advisories as information becomes available. This approach provides for the flexibility to develop a cost effective monitoring program that can be implemented to meet local need. Therefore, I would question the need to include specific compounds and detail regarding monitoring frequency in legislation.

Broad range monitoring of many potential contaminants, for example the toxic pollutants listed under Section 307 of the Clean

Water Act, does not seem to be a logical approach for monitoring the quality of drinking water throughout the country and may be of little value in determining the quality and safety of the public water supplies. A significant expenditure of staff effort and money would result. These resources could more wisely be used in dealing with other important operating and treatment problems that perhaps would result in a safer water supply particularly as it relates to the smaller water systems. The sampling and analyses of many of the compounds listed in the Clean Water Act are extremely complex and somewhat difficult. Collection and analysis of several samples may be needed to establish the level of some of these contaminants in the water.

COST

A range of estimated costs for monitoring related to the Safe Drinking Water Act is provided in the following table for your information. These fees may vary depending upon the geographical location, the volume of work performed for the client, and other local factors.

<u>PARAMETER OR CONTAMINANTS</u>	<u>ESTIMATED FEE/SAMPLE</u>
Coliform Bacteria	\$ 3 - 10
Turbidity	4 - 12
Regulated Inorganic Contaminants (10)	80 - 150
Regulated Organic Contaminants (8)	120 - 180
Regulated Radionuclides	90 - 130
Regulated Trihalomethanes (4)	60 - 75
Volatile Organic Chemicals (14)	100 - 200
Toxic Pollutants Clean Water Act Section 307	1,000 - 2,000

These costs are for the laboratory analysis and normal laboratory quality assurance work, but does not include the cost of sample collection and special quality assurance work that will be required for some of the parameters. This additional cost can be expected to vary from system to system.

CONCLUSIONS

In conclusion, it is requested that you consider the following points in developing legislation that will amend the current Safe Drinking Water Act.

- A. The definitions of "public water system" should not be changed but should include the small public water supply systems as in the past and that monitoring regulations apply to all systems equally.
- B. Provisions should be made to financially support the smaller water systems for the monitoring of contaminants other than normal operating parameters in order to minimize the financial burden caused by the regulations related to this Act.
- C. Any amendments to the Act should provide for flexibility in adding or removing a contaminant from the regulated list and for the establishment of a monitoring schedule based upon health effects research and influenced by local conditions.
- D. Specific contaminants and monitoring frequency should not be part of the legislation but should be established by regulation based upon scientific data and health effects research information as provided for in the current Act.

I wish to thank you for the opportunity as a representative of the American Council of Independent Laboratories to offer this information in regard to the Safe Drinking Water Act for your consideration. The Council stands ready to provide additional assistance in the future regarding the Safe Drinking Water Act at your request.

TESTIMONY BY ARNOLD ONSTAD
TO THE SUBCOMMITTEE ON TOXIC SUBSTANCES AND ENVIRONMENTAL OVERSIGHT
JANUARY 19, 1984

I am Arnold Onstad, Chairman of the Southern Minnesota Rivers Basin Council. Our Council is composed of 11 County Commissioners and Governor appointed members from the area in Minnesota comprising the watersheds of the Minnesota River and the southeast tributaries of the Mississippi River.

Our Council worked with the USDA as they conducted a Type IV River Basin study of the area. The study pointed out that the most severe problems of southeast Minnesota are erosion and water quality.

Southeast Minnesota is predominantly rural. Most people rely on ground water for their water source, and the area is blessed with an abundant quantity of ground water.

While the quantity is not a problem, safeguarding the quality is. The area is a Karst region, which means there is a porous limestone formation very near the surface. Water moves very quickly in this formation; it may enter the surface in one place and reach nearby wells in hours or days with little, if any, purification.

Because of the direct interaction between surface water runoff and infiltration with ground water in this region, the introduction of contaminants from the land surface into the ground water is of great concern. Since the residents rely on ground water for their water supply, we must protect this resource from contamination from nitrates, pesticides, bacteria and other pollutants.

The residents in this region are increasingly aware of the threats to their ground water. A few years ago it was discovered that toxic chemicals were illegally dumped at a landfill in Spring Valley, Minnesota. Citizens were very

concerned about the health implications of this. Newspapers were filled with stories of illnesses that were alleged to be caused by contaminated water.

This landfill is now closed, but the threat to the water supply from this source and many others is still with us. In the past several months two local papers, the Rochester Post Bulletin and the Red Wing Republican Eagle, ran a series of articles about the threat to our ground water from such sources as farm chemicals, septic systems and feedlots. The public understanding is growing along with its concern.

Since pollution of our groundwater can occur by any number of practices and substances, our Council, decided the best strategy would be to help the local officials understand the problem and possible solutions. We worked with the Water Planning Board (now merged into the Environmental Quality Board) and Agricultural Extension Service and helped the counties form task forces comprising county commissioners and local staff. There are presently two task forces, each composed of four counties, working in southeast Minnesota on ground water protection issues. State agencies, such as the Pollution Control Agency and the Department of Health, provide technical assistance to these groups.

With each task force we examined the various causes of ground water pollution such as landfills, feedlots, improper well construction, erosion, septic systems and improper application of fertilizers and pesticides. One group has spent over a year studying alternative ways of handling solid waste, since landfills pose such a significant threat to the water supply in southeast Minnesota.

These task forces are examining local measures such as requiring permits for well construction and local ordinances, and are trying to address the educational needs by sponsoring a conference on March 30 for all of southeast Minnesota entitled, "Karst, Groundwater and Local Responsibility".

In southeast Minnesota soil conservation practices are very important, since much of the land is subject to erosion. Don Ferren, State Conservationist with SCS, attended one of our task force meetings and said that SCS will now also address water quality concerns in addition to erosion control. This is good news, since water quality is so important in southeast Minnesota.

There is a study in northeast Iowa, in a region similar to southeast Minnesota, by the Iowa Geological Survey under the auspices of a river basin study by USDA, that showed a 230% increase in nitrate concentrations in groundwater since the late 1960's. They attributed this to the increased application of nitrogen fertilizers. This study also showed low levels (well below toxic levels) of herbicides such as atrazine, bladex, and lasso in the groundwater. Don Ferren agreed we need much more information on the effects of various conservation practices on water quality.

There is a Rural Clean Water Project at Garvin Brook in Winona County. The purpose of the project is to improve water quality by providing cost sharing for best management practices. However, no monitoring money is included in the federal funding. Yet monitoring is absolutely necessary in order to find out how various conservation measures affect ground and surface water quality.

The State of Minnesota is providing some water quality monitoring for this study. Minnesota experienced a severe budget crisis in the past few years and providing monitoring for this project placed an added burden on the state budget. We think this is a federal responsibility.

The recent monitoring of 80 wells in the Garvin Brook project indicated 21% displayed nitrate-N over the drinking water standard of 10 mg/l. An additional 36% contained nitrate-N levels over 3 mg/l. This demonstrates there is a problem. This information can only be obtained by a carefully designed monitoring program. It is essential to understand how various practices affect ground and surface water in order to know what measures are needed to

protect both the soil and water resources.

We think the federal government should conduct research on the effects of various conservation practices, such as conservation tillage, on both ground and surface water quality. Federal funds should be provided for monitoring our ground water. Most Minnesota residents rely on groundwater for their water supply and a comprehensive statewide monitoring system would provide the data needed to insure the safety of this resource.

Federal agencies must coordinate their programs to insure all are aimed at ground water protection. EPA is currently preparing a ground water strategy, yet it is essential that this strategy include other federal programs such as those of USDA.

We are encouraged that USDA is making water quality a priority. We hope Congress will insure that this emphasis continues.

We are developing a good cooperative effort in southeast Minnesota between the state and the local level to address water related issues. We need the support of the federal agencies. We also need the research, funding and data that only the federal government can provide in order to better understand the complex ground water system and the causes and effects of ground water contamination. Clean water is an important national resource and all levels need to work together to insure it is protected.

We are pleased you invited me to speak today and encourage your continued interest in this important subject. We will assist you in any way we can.

GROUND WATER CONTAMINATION

THURSDAY, MARCH 1, 1984

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, D.C.

The committee met, pursuant to notice, at 1:08 p.m., in room SD-406, Dirksen Senate Office Building, Senator Dave Durenberger (acting chairman of the committee) presiding.

Present: Senator Durenberger.

OPENING STATEMENT OF HON. DAVE DURENBERGER, U.S. SENATOR FROM THE STATE OF MINNESOTA

Senator DURENBERGER. Good afternoon.

The hearing will come to order.

Today we are considering legislation to protect our Nation's ground water from contamination by leaking underground storage tanks.

The Subcommittee on Toxic Substances and Environmental Oversight previously addressed this issue at a hearing last November. At that time, we were briefed on the Environmental Protection Agency's plans to protect ground water from both regulated and unregulated sources of pollution. Experts identified leaking underground storage tanks as a major source of ground water pollution by gasoline and other organic chemicals.

Since that hearing, the problem of leaking underground storage tanks has been referred to as an emerging issue. We have to remember, however, that the problem has been with us for many years. The only thing that is "emerging" is our awareness of this pollution threat and the realization that action must be taken to address it.

The potential dimensions of the problem are staggering. Estimates of the number of underground storage tanks containing gasoline alone range from 1.5 to 2.5 million. As for the number of other underground tanks, we don't even know enough to guess.

We do know, however, that a majority of the tanks are bare steel, without any protection against corrosion. We have been told that thousands—perhaps hundreds of thousands—of those tanks are leaking. Estimates of leaking tanks range from 75,000 to 420,000 nationwide. And we know that leaks can cause, and have caused, extensive environmental damage. Many communities and individuals have lost their drinking water supplies to pollution by gasoline or other substances leaking from underground storage tanks. The threat to human health and the environment is unacceptable.

I have introduced an amendment to establish a comprehensive program at the State and Federal levels to reduce this threat. The amendment would require performance standards for new underground storage tanks; regulations for the detection, prevention, and correction of releases from underground storage tanks; and enforcement or response to releases from underground storage tanks.

The amendment would grant to the States primary enforcement authority for regulating underground storage tanks. Some States have already established programs, and other States should be encouraged to do the same.

This issue, like so many others, is best addressed at the State or the local level, close to those who are affected by the problem and by the program designed to solve it.

I am looking forward to the testimony today. The witnesses will offer different perspectives on the nature of the problem and the means of reducing the risks from underground tanks.

I know that the experts, the trade groups, and the State and local governments dealing with this problem on a daily basis share an interest in eliminating these leaks. I expect that through these proceedings we will find that common ground which will provide a sound base for our cooperative effort.

I will welcome first the Hon. Don Ritter, Congressman from the State of Pennsylvania.

Don, I appreciate your leadership on this issue on the House side, and we look forward to your testimony.

STATEMENT OF HON. DON RITTER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF PENNSYLVANIA

Mr. RITTER. Thank you, Mr. Chairman.

It is a pleasure to be here today and to discuss a problem of national significance, ground water contamination by gasoline and other petroleum and hydrocarbon products.

I commend the chairman for his leadership in moving quickly to hold hearings on this important problem.

I am pleased to have been the first Member of Congress to introduce legislation designed to deal with problems that people are having with existing contaminated sources of water and to make recommendations for regulatory standards to be developed for buried tanks containing gasoline, liquid hydrocarbons, and other similar liquids. The problem is growing. The costliest, most painful strategy at this time would be to continue waiting.

More and more, gasoline or similar liquids are being found in the tapwater of American households. Ground water provides drinking water to half the American people. We all know how essential it is; yet all of us are familiar with individuals whose wells have been contaminated by gasoline or similar substances. I have personally gone to constituents' homes and smelled and tasted their water. But families like the Heffelfingers, the Sukeenas, and the Yesthals in the Lehigh Valley of Pennsylvania are not alone. The problem is nationwide.

The problem will get worse before it gets better as more and more old, buried tanks rust through and leak their contents into the ground water. The chairman has begun to describe the scope of

the problem. It is estimated that 1.4 million underground tanks in the United States store gasoline. An unknown additional number of tanks store a variety of other petroleum products and other liquid hydrocarbons.

Of the 1.4 million underground tanks storing gasoline, approximately 85 percent are made of steel with no corrosion protection and were buried over 20 years ago. As a former metallurgist who worked in the area of steel and welding and corrosion, there is no doubt that we have a problem that perhaps has just reached its threshold level and can only get worse if we are inactive.

Some experts estimate that 75,000 to 100,000 of these underground gasoline tanks may currently be leaking their contents into the ground and ground water supplies, and perhaps 350,000 tanks may be leaking within the next 5 years. This is a problem of national significance.

I have introduced legislation on the House side, H.R. 4985, which provides for relief, cleanup, and for preventative standards to be set by EPA for existing and future buried tanks. My bill will tackle this problem in two different ways.

First, it amends Superfund by removing the petroleum exclusion, which then gives EPA the authority to clean up gasoline leaks which have occurred from underground storage tanks or gasoline in the ground water, if the tank is not identified, and it makes fund moneys available for these cleanup or other assistance activities.

The authority available to EPA includes the ability to take remedial actions that are necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, such as the provision of alternate water supplies for individuals affected with gasoline in their tapwater, temporary evacuation and housing of threatened individuals, if such a situation poses a direct and immediate threat. In those situations, EPA would be authorized under Superfund to spend up to \$1 million for each situation, and it is a quick response capability. Longer term remedies for a period of up to 6 months would also be covered by this remedial action of up to \$1 million and would make funds available for ground water cleanup.

The money for the cleanup activities will come from the Superfund trust fund, and in cases where a responsible party can be identified, the bill gives EPA the authority to recover cleanup costs from them. Superfund liability provisions would be available for the agency to use against all responsible parties who have either caused or contributed to these leaks.

It is my intention that the agency use these liability provisions in an evenhanded way, so that responsible parties pay their fair share for damages that have occurred.

The second approach my bill takes toward solving this problem is to require EPA to establish general standards applicable to new and existing underground storage tanks which are used for commercial or governmental purposes. This is the common ground between, Senator Durenberger, your bill and the House bill, H.R. 4985. These standards may include a wide variety of factors addressing the location, design, construction, operation, and maintenance of the tanks as well as monitoring, testing, financial respon-

sibility, inspection, and corrective action for such tanks. In addition, I have directed the EPA to evaluate residential tanks as well. That study is to be completed within 1 year of the date of enactment of my bill.

I might add that your bill goes into considerably greater regulatory structure than my bill does. I had felt that the situation was so wide ranging and so complex that perhaps some time would be necessary between giving the authority to EPA and study tanks and coming up with regulatory standards.

Individual permits under my bill would not necessarily be required for each tank. Rather, the EPA Administrator is given the discretion to set up a permit program where he decides one is necessary. An example of this would be where specific factors, such as soil conditions, type of tank, years in ground, moisture, and other environmental factors should be taken into account. Otherwise the Administrator can implement the standards as set forth as a result of this bill directly.

Other key features of my bill are included to promote self-enforcement of the bill's goals. An insurance liability requirement is included to cover potential damages from underground leaks, and suppliers would have an opportunity to deny product to those engaged in storage if the storage facilities were substandard. Again, this is a way to try to have some kind of self-policing to the bill.

I notice that your bill also has an insurance liability requirement but encompassing the factor of bodily injury in addition to a generalized requirement on responsibility for damages.

In conclusion, I would like to underscore the importance of addressing this emerging national environmental problem. As a scientist-Congressman, as a former metallurgist, I believe that I, in serving on the Subcommittee on Commerce, Transportation, and Tourism, which is the equivalent subcommittee on the House side, can make a contribution to the solution of this problem.

I will be working closely with State and local officials as well to insure coordination with the appropriate Federal agencies.

I have introduced this bill because I believe it takes a strong and comprehensive approach to begin to resolve the crisis. It provides for both cleanup authority for environmental contamination that has occurred; it addresses the problem of existing inground tanks and situations where individuals have been damaged and harmed by gasoline in ground water which cannot be traced; and it seeks to minimize future problems by requiring that new underground storage tanks be safe, and that a regulatory program be established within 1 year of the date of enactment of the bill to deal with existing tanks and new burials.

I appreciate the opportunity, Senator Durenberger, to appear before your subcommittee and will be happy to respond to any questions at this time.

Senator DURENBERGER. Don, thank you very much.

I only have one question, have any hearings been scheduled on your bill?

Mr. RITTER. We have not at the present time. Our subcommittee is engaged in a wide-ranging set of hearings on early reauthorization of Superfund. There are two bills currently, and we are con-

cerned with those. I would believe in the near future we would trying to hold hearings.

I commend the Senator. These are the first hearings to be held of this kind, and not too soon, I might add.

Senator DURENBERGER. I thank you very much for your testimony and appreciate your initiative a great deal. We will work together.

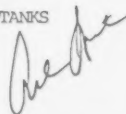
Thank you.

Senator Specter has submitted a statement which will be made part of the record.

[The statement referred to follows:]

PREPARED STATEMENT
BEFORE THE SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
BY SENATOR ARLEN SPECTER
ON
UNDERGROUND STORAGE TANKS

LEGISLATIVE HEARINGS ON UNDERGROUND STORAGE TANKS



Mr. Chairman, I am pleased to have the opportunity to participate in this hearing on underground storage tanks. I commend the chairman for scheduling this hearing and for his recognition of this committee's responsibility to continue its efforts to resolve this most difficult and timely issue.

On February 11, 1984, I visited Cherryville, Pennsylvania, northwest of Allentown, with Congressman Ritter. The residents of Cherryville and Hanover Township, Northampton County, have been plagued with gas contaminated water for over 3 years, but have been unable to get cleanup help from the EPA because Superfund excludes cleanup of water contaminated by petroleum products. Since that time, we have learned of contaminated water supplies in Lebanon, Pennsylvania. But this is not a problem limited to Pennsylvania, it is clearly national in scope.

An article in the U.S. News & World Report, January 16, 1984, reveals that authorities in Lee, Maine had found that an estimated 10,000 gallons of gasoline had leaked from service station tanks. Estimates of the number of underground storage tanks (gasoline) in the nation run from 1.4 to 2.5 million. EPA officials estimate that as many as 100,000 underground storage tanks are leaking 11 million gallons a year. Other sources indicate that as many as 420,000 tanks may be leaking now, and experts predict that 75% of all tanks will begin leaking over the next 5 to 10 years. One gallon of gasoline can ruin 750,000 gallons of water.

As Pennsylvania residents can tell you, and as I now know from personal experience, at low concentrations, (several parts per billion), the presence of gasoline can be smelled or tasted, rendering the supply objectionable. But experts tell us gasoline

vapors have caused kidney tumors in rats, and that benzene, a component of gasoline, is a known cause of cancer in humans.

The significance of this problem becomes clear when you realize that ground water resources represent about 50% of the nation's drinking water supplies, as well as other water needs.

Leaking underground storage tanks have been identified by EPA and independent experts as one of the major sources of groundwater contamination, yet storage tanks are not regulated under federal law. In addition, any state laws or regulations pertaining to underground storage tanks have generally been restricted, referring mainly to the prevention of fire and explosion hazards. Though several states have recently passed statutes or are presently working on regulations to protect groundwater, little has been done to effect a change in the overall situation. It is my hope that the work being done today and the information that I have presented demonstrating my commitment to this issue will serve to correct this already serious and presently escalating problem that affects us all.

As I bring my statement to a close, I should like to inform the Chairman and his fellow committee members that I and my colleague from Pennsylvania, Senator Heinz, will be introducing a bill to amend the Comprehensive Environmental Response; Compensation, and Liability Act of 1980. This legislation will give the EPA authority and funds to clean up gasoline leaks from underground storage tanks. It will also require the EPA to establish general standards applicable to new and existing underground storage tanks used for commercial and governmental purposes, and to evaluate residential tanks. In this effort, Senator Heinz and I join the Honorable Don Ritter of the Commonwealth of Pennsylvania, who has introduced this legislation in the U.S. House of Representatives.

Again, I thank the committee for allowing me to testify here today on this important and timely issue.

Senator DURENBERGER. Our next witnesses will be a panel: Frederick Killmar, Killmar Associates, Great Falls, Virginia; Paul Yaniga, principal hydrogeologist/general manager, Groundwater Technology, Chadds Ford, Pa; Max Clay, executive vice president, the Planning Corp, Vienna, Va.

All right. Thank you very much for being here.

I know you have a lot to tell us. You are going to be encouraged to limit your remarks to 7 minutes, and anything else you have to say may be made part of the record now or, I'm sure, in the future as we deal with this issue.

We'll start first with Mr. Killmar.

STATEMENT OF FREDERICK B. KILLMAR, PRESIDENT, KILLMAR ASSOCIATES, INC., GREAT FALLS, VA.

Mr. KILLMAR. Mr. Chairman, it is a pleasure to be here today to discuss the underground storage of petroleum products and leaks from underground tanks and piping systems.

I am Frederick B. Killmar, president of Killmar Associates. My company specializes in the storage and handling of petroleum products and works for a variety of clients, including petroleum equipment manufacturers, oil companies, engineering firms, associations, and attorneys or law firms which represent petroleum marketers.

Today I am speaking for myself as a geologist and individual who has been keenly interested in petroleum storage for nearly a decade. I am a former employee of the American Petroleum Institute, where I served for 6 years as the coordinator of the institute's underground leakage program. I also served as the coordinator of API's safety and fire protection activities.

I have been requested by staff to provide this committee with background information on underground leaks. I plan to limit my testimony to that subject and not address the specifics of various legislative proposals.

The problem which we will be discussing today is quite complex. No doubt others who have testified before this committee on a number of issues have opened with that statement. The complexity of underground tank leakage should become apparent as I attempt to explain the Nation's underground tank population.

No person, association, or Government agency knows how many tanks are in use throughout the country. Estimates range from a low of 1.2 million to over 3 million tanks. And these figures exclude the million or more underground tanks that store heating oil at residences. The current estimate is that there are 210,000 units where any motorist can buy gasoline. These include service stations, convenience stores, mass merchandisers, general stores, and the like. If each of these facilities had an average of three underground tanks, then marketing facilities would account for 630,000 of the Nation's underground storage tanks.

It is believed, however, that for every tank that is buried at a location which markets gasoline there is at least one tank that stores petroleum products at another type of facility. Every major corporation probably owns tanks. There are thousands of tanks located on farms. Municipal and State facilities store fuels, as do a

variety of locations, including car rental agencies, mass transit authorities, military bases, hospitals, schools, and many other types of facilities which are detailed in my written testimony.

Nobody knows the size of the tank universe, but everyone should recognize that it is quite large and quite diverse.

Adding to this subject's complexity are the many different types of companies and individuals who have the responsibility for the day-to-day operation of the facility, and that responsibility includes the maintenance of inventory control records and the detection and reporting of leaks should they develop.

Major oil companies probably own 25 to 35 percent of the Nation's tanks. At only a percentage of these locations is a company employee responsible for the facility's day-to-day operation. At most locations the facility is leased to a dealer. Wholesalers own a large number of tanks. They operate their locations both by company employees and dealers. They also own tanks at consumer accounts, such as local taxi companies. The wholesaler installed the tanks at his expense on another company's property as part of a business arrangement whereby the wholesaler supplies the product to the consumer.

The ownership and operation of some facilities can be extremely complicated. One individual may own the land which is leased on a long-term basis to a second individual who builds a marketing facility. The tanks at the location may be owned by a third party, the wholesaler, who supplies the products to the location, and a fourth party may lease or sublease the facility to operate the location on a day-to-day basis.

Leaks from underground tanks and piping systems have occurred for years. Although most people may not believe me, I am confident that only 10 percent of the tanks and pipes which have failed in the past actually created problems. In many cases the failure was quickly detected by water entering a tank or by a piping leak detector or by a discrepancy in inventory records. The pipe or tank was repaired or replaced and the community was not adversely affected. But when a leak is not quickly detected, the unconfined petroleum products may present several problems:

- Fire or explosion;

- Damage or destruction of sewers and sewage treatment plants;

- The loss of telecommunications service;

- The disruption of businesses and families when flammable vapors enter buildings.

Only during the past several years has ground water contamination from underground leaks been recognized as being a problem of significant magnitude to deserve such notoriety.

There are many ways in which product can leak from a storage and piping system: Deteriorated "O" rings in pumps, loose plugs in tanks, improperly cemented unions, ruptured hoses, pressure couplings that have worked loose, the physical breakage of tanks or pipes, or the failure of flex connectors, but these causes combined are minor when compared to the major leak source—corrosion.

Statistics I gathered while employed at API verify that statement. It was learned from 1,717 tank and piping leak survey questionnaires that, of the 540 piping leaks which were reported, 66.6 percent were caused by corrosion. It was shown that 90.7 percent of

the steel tank leaks were the result of corrosion. Remember, leaks not only are a potential threat to ground water, they can create fire and safety concerns, as I mentioned.

Fire codes have addressed leak prevention and detection for years. In my prepared testimony I cover in some detail how codes affect product storage and how they recently have been strengthened to provide further protection for the community. If the States and communities throughout this country were to adopt and enforce the current editions of these codes, such as the National Fire Protection Association's "Flammable and Combustible Liquids Code-30," which is considered by most to be the authoritative code, most likely there would be no reason why this committee should find it necessary to conduct this hearing.

These codes, particularly NFPA-30, contain sensible requirements for the use of proper types of tanks, piping, leak detectors on pressure piping systems, accurate daily inventory control as well as strict installation procedures.

Three concluding points are worthy of mention:

First, not only is this problem quite complex, but the awareness level of tank owners varies significantly. No doubt most of you recognize that several major companies have initiated very complex leak prevention and detection programs costing hundreds of millions of dollars. Although other marketers of various sizes may not have addressed or have invested such sums, most are aware of the problem.

You should also recognize, however, that a large number of small firms which own only a few tanks, if their owners were here today, they would probably be amazed to hear that the Federal Government is deeply concerned about the condition of the tanks located at their facilities. Education is needed, even though petroleum marketing associations and trade publications continue to stress the need for leak prevention and leak detection.

Second, many States and municipalities already have taken steps to address underground leaks. Some of these locations have exceedingly important ground water supplies which are highly susceptible to contamination from leaks. Suffolk County, N.Y., and Dade County, Fla., serve as examples of such areas.

Although I may not necessarily agree with the specifics of the regulations, I can appreciate why they found it necessary to take actions to prevent future problems. It should be noted that all areas of the country are not as sensitive to underground leaks as these two communities and do not warrant such stringent regulations. No doubt there are other areas where regulations are appropriate, but is it actually necessary for the Federal Government to become involved with a subject which probably can be better handled on a more site-specific basis by the States and the counties?

Finally, if the Federal Government does become involved with the underground storage of products, recognize that there really is no need to reinvent the wheel or build a better mousetrap. Agencies do not need to spend tax dollars in an attempt to design new types of storage systems or find new ways of installing them. Recently updated codes, standards, and industry recommended practices address the solutions to leaks. These need to be adopted and enforced at the State and local level.

Thank you for the opportunity to testify. I would be most happy to answer any questions.

Senator DURENBERGER. Thank you for your testimony.

Mr. Yaniga.

**STATEMENT OF PAUL M. YANIGA, PRINCIPAL HYDROGEOLOGIST
AND GENERAL MANAGER, GROUNDWATER TECHNOLOGY,
CHADDS FORD, PA.**

Mr. YANIGA. Good afternoon, Mr. Chairman.

Let me take a moment to introduce myself. I'm the principal hydrogeologist and general manager of Groundwater Technology. Groundwater Technology is a company that specializes in the assessment, definition, and cleanup of leaks from below-ground storage tanks. I'm also vice president of Oil Recovery Systems, which is a company specializing in detection equipment and cleanup equipment for such leaks.

My professional background includes an M.S. in geology from Lehigh University; I'm a certified professional geologist with 12 years of active experience in my professional career. I've worked on hundreds of ground water contamination cases both within the United States and outside its borders, including the Caribbean, South America, Asia, and New Zealand.

I would like to discuss some of the physical conditions that arise from leaks and losses from subsurface storage tanks and from subsurface piping systems. I would also like to explain some of the socioeconomic factors that occur as a result of those leaks. I am also going to discuss some of the cleanup options and alternatives that are currently available and those that are evolving.

I have also prepared some written testimony that has been introduced. I am not going to go into that in any particular detail, but there are three figures in the back of that document that I will be making reference to.

I would like to begin by saying that leaks have, do, and will continue to occur. Not all leaks are a problem. Leaks are not necessarily restricted to the metro Washington area or to the United States or to the continental boundaries of North America. I have worked in situations where they are just ubiquitous. They are everywhere.

Not all of these leaks will become a problem. They become a problem when someone or something of value to someone becomes impacted. Some of the symptomatic factors that make these leaks a problem, as Mr. Kilmer mentioned earlier, include the accumulation of vapors in people's homes, accumulation of vapors in subway systems and utility conduits; the accumulation of liquid hydrocarbons within those same facilities and impacts in terms of taste and odor in water supply wells, in springs, surface waters, and of course the public concern, the fear, that something might occur—the fear of an explosion, the fear of the long-term health effects are all symptoms of the problems of loss.

Among the physical factors that make these leaks a problem is the quantity of the material that is spilled. Obviously, there is a far greater difference in a gallon being spilled on the surface of this floor as opposed to several thousands of gallons being spilled into the subsurface system in an area that's dependent upon shallow

groundwater supply wells or an area that is characterized to very porous, permeable soils where the material rapidly transmits itself to the groundwater system.

The type of material is also very important. There is a difference between spilling gasoline from a gasoline storage tank versus spilling No. 6 heavy viscous fuel oil. The lighter the material, the more quickly it will move through the subsurface environment; the more likely it will volatilize; the more likely it will give off undesirable factors such as vapors and potential for explosion.

The subsurface soils and subsurface geology are also factors that greatly impact whether a leak causes a problem. The more permeable the material, the more quickly liquids can pass through it to the ground water system. The more open space (porosity) there are, the more likely it is that a problem will develop. The shallower the ground water system, the greater the quantity of spill, the more likely a problem will develop. The greater the dependence of any particular area on a ground water supply or on a system that can easily be impacted by these leaks and losses, the more likely a problem will occur.

The normal procedures for determining whether a leak is going to be a problem involve the detailed assessment and analysis of site conditions. The first step in trying to determine whether a problem will occur is to collect some of the background data: What was the quantity of material that was lost? How much was lost? What are the site-specific conditions? What are the physical conditions that affect it? To address these points it is necessary to assemble background information on the subsurface conditions, on the ground water conditions—to do a specific site survey to determine whether there are wells in the area, whether there are sensitive facilities; to conduct field analyses to determine whether vapors can and will migrate; to determine the presence of vapors; to determine if vapors are present in concentrations that are of health concern; to determine if vapors are present in concentrations that are of flammable concern.

If, after this first phase of investigation, you determine that there is a significant potential for a problem, move forward into determining whether ground water has indeed been impacted. This is normally done by the installation of observation wells, which are especially designed systems that act as windows into the subsurface—facilities from which data can be gathered to determine whether soil has been contaminated, whether there's a dissolved fraction in the ground water, and whether there are free floating organics sitting on top of the water table.

From this data, you would be able to prepare a site base map which will tell you the direction of movement, the potential down gradient impacted parties, and the thickness or the magnitude of the problem that you are dealing with.

In trying to determine this, you are looking for both free product—that is, product that is floating on the water table—and product that may be dissolved into the ground water system.

You also want to determine whether, after gathering this information, a cleanup is necessary—whether attention to the problem is needed. You also need to determine whether there is a feasible means to collect the product—a feasible means to accomplish this

task. Normally, this will involve some aquifer testing, some hydrogeologic evaluation.

Once you develop all of this data, you then determine whether your leak has indeed caused a problem. This conclusion is a very site-specific situation, a very site-specific evaluation. Every site differs hydrogeologically, and sociopolitically.

Once you have determined that, indeed, you do have a problem, you have to determine how are you going to treat it and with what you are going to treat the problem. You end up with a list of alternatives. Some of those alternatives can be to do nothing. The problem may be remote, such that no impacted parties are there currently or will be there in the future. Another alternative may be a situation where there is some suspicion that the problem may move, and you would monitor it for some period of time.

When you determine that a problem requires treatment, invariably the first observation of a problem is usually vapors—some symptomatic odors. In my personal experience, I have been involved in many situations where you deal with the vapors before you actually deal with the problem. The problem is often the free-floating organic; the problem is the fugitive organic that is either tied up in the soil or is dissolved in or floating on the water table. However, before you can move to really correct that problem, you always address the symptoms—the vapor problems.

There are alternatives for dealing with vapors. Vapors will normally accumulate in confined areas of reduced pressure. They always end up being worse in the period of the year when the frost is in the ground or when the soils are water saturated and the vapors can't vent naturally to the atmosphere. They also normally occur during the cold season, when houses are heated and acting as low pressure areas. The same thing occurs within subway systems, within sewer systems, and within below-ground facilities.

In terms of addressing particular vapor problems, there are alternatives. One of the most commonly employed alternatives is to turn over the air within that facility. Take clean air from the outside, dilute it with the contaminated air, and again return it to the outside. This works strictly on a dilution factor. It is also a mechanism that tends to induce vapor flow into the structure, because you have further reduced the pressure at that zone.

One of the more applicable techniques, rather than pulling air through, is to force clean air from the outside into the structure and create a positive pressure system. I go into some detail in describing this in my text.

Dealing with the vapor problems is something that is always necessary. With positive pressure, you put a pressure inside the building that doesn't allow any vapors to enter. You can also exert a negative pressure on the soil to draw the vapors up before they accumulate in the building, in the subway tube, or in an elevator shaft.

The symptoms are almost always the same. The symptom that is most often noticed is that of vapors. The physical parameters that are associated around that vapor situation go back to the leak or the loss itself.

Figure No. 1 of my text is a diagram showing a leak or a loss from a tank. What it shows is that as the leak occurs, the domi-

nant factor is gravity. Gravity moves the organic downward under its influence, adsorbs a certain quantity of material into the soil, and collects a certain amount in a free-floating fashion on top of the water table. A certain volume of the loss may also dissolve into the water table. Some of the more soluble components—of gasoline are benzene, toluene, and xylene.

As a function of those organic materials accumulating both in the soil and on top of the water table, and dissolving in the groundwater, vaporization will occur, and it will move upward. It will volatilize while moving upward, looking for reduced pressure points.

Figure No. 2 in the prepared testimony shows the methodologies that I feel are applicable to resolve those particular types of situations—either the negative pressure or the positive pressure, or a combination of the two for vapors.

After you have dealt with the symptomatic problems that are normally present—

Senator DURENBERGER. Are you getting near the end of your statement?

Mr. YANIGA. Shortly.

Senator DURENBERGER. OK.

Mr. YANIGA. After you have dealt with the symptomatic problems, you move forward into dealing with the free product end of it, which can be accomplished with a two-pump system, a centralized pump to remove the free-floating product from one location and another pump to strip it off the mobile hydrocarbon.

In addition to mobile hydrocarbon recovery, other alternatives include dealing with the absorbed and the dissolved fractions. This can be handled by an airstripping process or it can be handled by biodegradation. All of these things are pointed out in the prepared text. I think they are fairly straightforward.

I think, in summary, what I can say about the situation is that the problem does exist; it probably will continue to exist. We will continue to find out more about the problem from the standpoint that we are constantly rediscovering old leaks. I think it will be resolved. It will be resolved from the standpoint of applying a combination of governmental effort, industrial know-how, and the application of the sound scientific principles that have been learned about this particular problem over the last half dozen years.

Thank you very much.

Senator DURENBERGER. Thank you very much.

Mr. Clay.

STATEMENT OF MAX CLAY, EXECUTIVE VICE PRESIDENT, THE PLANNING CORP., VIENNA, VA.

Mr. CLAY. Thank you, Mr. Chairman.

I represent the Planning Corp., which is an independent insurance agency domiciled in Vienna, Va., and Chicago, Ill. We are independent brokers. We do not represent the insurance industry, but we work on behalf of our clients to develop insurance policies that fit the needs of our clients and that are both comprehensive and equitable in price.

About 18 months ago we became involved with a large national petroleum association in attempting to develop an insurance program for their jobber members to take care of gradual pollution leaks. This is pretty much of a new field for the insurance industry.

The reason that there is a need for gradual pollution insurance is because in the early seventies all of the insurance companies writing standard liability policies endorsed their policies to exclude any type of pollution unless such pollution was sudden and accidental. This has been interpreted to mean that any leak of a slow or gradual nature that occurs in underground tanks would be excluded. If a station, or an owner-operator, or dealer or jobber wanted to cover gradual leaks from underground storage tanks, he would have to purchase separate insurance to cover just gradual pollution.

I might add there are a few general liability underwriters who have been willing to take out their gradual leak exclusion for a price, but this is very rare.

At this time I would estimate that there are probably less than 10 insurance companies that are willing to provide gradual pollution coverage on underground petroleum storage tanks. It is somewhat of an unknown risk, and we really don't know what to expect.

Over the last 18 months we have written approximately 6,100 stations with perhaps 4 underground storage tanks per station. Our policies cover bulk fuel facilities and retail stations, including all of the storage tanks, and we are also willing to include miscellaneous farm and commercial tanks. We write a comprehensive policy that encompasses all of the gradual pollution liability needs of a particular risk.

Again, this is very difficult coverage to purchase. We, as far as I know, are one of the few insurance agencies who are actively marketing throughout the United States in an attempt to acquire this class of business.

Rating is somewhat flexible. I can give you an idea, and I wouldn't hold to this, but on the average a station can purchase \$1 million of liability coverage for an annual premium of approximately \$300 to \$700. That is a rule of thumb. We are offering \$1 million policies as a minimum amount of coverage.

Limits are available above \$1 million, generally up to about \$10 million. But as the amounts of liability become higher, the insurance becomes more difficult to obtain. So, generally, \$1 million is a pretty good standard. One million, we have found, is enough to take care of most claims.

Over the last 18 months we have responded to approximately 40 reports of leaks, and these encompass all types of pollution. In most cases the losses were minor, and we were able to resolve them with moderate cleanup costs. By moderate, I mean expenditures in the area of \$1,000 to \$20,000.

In a small number of instances, perhaps 3 out of the 40, we are involved in third-party litigation, and the amounts asked for vary from a low of about \$100,000 up to \$5.5 million, the latter in an instance where fumes permeated a shopping center adjacent to a retail station.

Again, we are not sure how this total risk is going to evolve, and we are going to attempt to base our premiums on the losses that we incur, if we can write enough business.

One would think that in offering this type of insurance dealers and jobbers would be rushing to purchase the coverage, but such is not the case. It is our feeling that the majority of operators, the majority of petroleum marketers, are not covered for slow tank leak insurance at this time. That may change. Certainly if there is a financial responsibility rule, that will change very rapidly.

In looking at a risk from an underwriting standpoint, and I have some personal opinions here having dealt with this subject for some time, the insurance underwriters will generally look at such things as tank construction, geographic location of the station, daily inventory control, tightness testing, tank replacement programs, and so on. All of these are logical and have been discussed in the past.

It is our opinion, if there were one regulation designed to control environmental pollution on the part of a filling station operator, it would be effective daily inventory control. Most States, as I understand, have a regulation that such daily inventory control be maintained, but there really is no widespread enforcement, and we are not aware of anybody who has been penalized because they did not have inventory control. But if inventory control is enforced, a leak can be detected in a relatively short period of time, and a cleanup can be done before it becomes widespread. It is, in my opinion, the one method of controlling leaks that will work.

One can test tanks periodically, but tank testing has a problem of telling you what the tank is doing at that moment, and the day after one tests the tank, the tank can begin leaking.

The tanks should be "sticked," as they say—before and after deliveries, and at the start of each shift and the end of each shift, that is the way that it is recommended.

Again, in our opinion, with inventory control a leak can be detected at an early point, and we can get in and do a cleanup. We—I'm talking from the insurance standpoint.

Now the insurance company's position on these leaks is that the quicker they respond, the less the cost will be to them. So there is an inherent desire on the part of the insurance company to respond.

It is our opinion, also, that if a dealer has insurance, he will be more likely to report a loss. If a dealer is not insured and determines that he has a tank leaking, he may feel that it is to his advantage to replace the tank and not report the loss of product unless it is discovered by a third party. If he has insurance, we believe that it is more likely that he will immediately call his insurance company and pass that liability off to the insurance company.

The insurance company, again, has a vested interest. It is to their benefit to respond as quickly as possible, to clean up as quickly as possible, and not let the gasoline spread into a wide area.

So, to sum up, gradual pollution insurance is available. We and others are writing it. It is not widespread. It is somewhat difficult to obtain. The pricing has not been established yet in any kind of coherent fashion, so there are major differentials in pricing, but if a mandatory insurance law is passed, it is my opinion that the in-

insurance industry can and will be in a position to respond with the required policies at that time.

Senator DURENBERGER. Of the 40 leaks you talked about, how many of them were detected and by what means? Let's get at how important inventory control might be.

Mr. CLAY. In the leaks that we have responded to, I would say that about half have been picked up by inventory control on the part of the dealer, and maybe another half have been discovered by a third party, whether it is from fumes getting into the sewer systems or into underground utility lines, which is a frequent occurrence, or somehow reaching the surface at a lower area than the station.

We ask on our applications whether a dealer has daily inventory control. It is one of the key elements of the application used to determine acceptability of the risk.

I would say that as you get into the rural areas and as you get down to the smaller operator—and by smaller operator, I mean a jobber who might only have one station as opposed to a larger organization that has a number of stations—inventory control tends to be lacking. We see quite a number of applications on which the respondent indicates that they have no inventory control, daily or otherwise.

Senator DURENBERGER. You picked out inventory control as one of the key criteria, what are some other factors that might vary the premium?

Mr. CLAY. It would vary by insurance company. Each insurance company has their own method of determining what they will cover. There are insurance companies that will not cover tanks over 20 years of age unless they are tested and certified as secure at that point. We do not take that approach. We are looking at tank ages. We are looking at location of the stations. We are looking at any marine exposure, where we might have a major water problem. We are looking primarily at inventory control. While we use tank ages to rate, we will not turn down a risk regardless of the construction of the tank or the age of the tank, whether it is protected or unprotected. We will write the insurance. We will rate up if they have these factors. But if they do not have effective daily inventory control, our position is to decline the risk.

Senator DURENBERGER. Let me ask, Rick and Paul, if you were in the insurance business, what you would use as criteria to set up premiums?

Mr. YANIGA. I think a very important criterion is that of inventory reconciliation. My experience over the last dozen years in dealing with below-ground storage tanks is that there is usually a lack of inventory control, a lack of measurements by which you can compare what was put into the tank versus what was sold out of the tank.

Most of the losses that I have been involved with during that period of time have been discovered after they have gotten off the station property and have impacted some third party. Usually what you will track it back to is a lack of inventory reconciliation.

Senator DURENBERGER. What you are saying, then, is that other factors, in terms of tank construction and the geology, and all those sort of things, are much less a factor? What I am obviously

getting at is, if there were criteria in the premium that would reduce the cost of the premium, it might be an incentive to replace an older tank, and so forth.

Mr. YANIGA. Other criteria could, indeed, have a part in it. They all play separate roles in different geologic environments, but the one that is universal is that of inventory reconciliation. It crosses all political, social, geographic, and geologic environments.

Senator DURENBERGER. Rick?

Mr. KILLMAR. During the years when I worked at API and also during the 3 years that I have been operating my own company, I must have worked on two dozen underground leak problems, where a product had entered a sewer or had entered into a basement. It was my responsibility to determine who actually was responsible for that problem. There has not been a single case that I have worked on where I have walked into a location that later turns out to be the source of that leak and have been presented accurate, daily inventory records. I still have not worked on a leak where a problem had been created in a sewer system or in a well where the operator was keeping accurate inventory records.

Senator DURENBERGER. What about the statistics on—I am in the iron ore business in my State, so I have to be careful here—but the statistics on steel tanks and generally on unprotected tanks? They are pretty overwhelming in terms of the corrosion?

Would any of you support a prohibition on bare steel tanks?

Mr. KILLMAR. I do not know if I would support a prohibition. I think the important thing to recognize is there are ways of protecting steel tanks. You can protect steel tanks with sacrificial anodes, a type of cathodic protection system. You can protect a steel tank with a thick, factory-applied coating of a noncorrosive material such as fiberglass. You can protect a steel tank using an impressed-current, cathodic protection system.

Now corrosive conditions do vary throughout the United States, and you will find areas where a test can be performed and you find that the soil—or the corrosive conditions are virtually innocuous. In those locations I suppose it would be appropriate to have a waiver where an individual could go ahead and buy an unprotected steel tank, but I think the statistics are overwhelming that those tanks that have no coating or no cathodic protection system, or are just coated with a simple asphaltic-type coating, the major source of leaks rests with those types of systems. It only seems appropriate to use better systems.

Senator DURENBERGER. Does anyone differ from that opinion? It sounds pretty logical.

Gentlemen, thank you all very much. We may have other questions to propound to you in writing, if we may.

Senator DURENBERGER. Our next witness is Leslie Dach, National Audubon Society.

I understand you have a time problem. I don't know how it can be more severe than mine, but go ahead.

Your full statement will be made part of the record, and please summarize it in 5 minutes, if you can.

STATEMENT OF LESLIE DACH, ASSOCIATE DIRECTOR OF
ENERGY AND ENVIRONMENT, NATIONAL AUDUBON SOCIETY,
ACCOMPANIED BY LINDA GREER, ENVIRONMENTAL DEFENSE
FUND

Mr. DACH. Thank you, Mr. Chairman.

My name is Leslie Dach. I am associate director of energy and environment with the National Audubon Society. Accompanying me today is Linda Greer, with the Environmental Defense Fund.

I would like to compliment the chairman for scheduling this hearing and for addressing himself to the task of creating Federal statutory authority to redress the problem of leaking underground storage tanks.

I would like to thank him for adjusting this schedule to make room for my previous commitment.

In our testimony today we would like to make the following three major points:

One, that the threat of contamination to ground water from underground storage tanks is real and serious;

Two, that current Federal law does not adequately address the problem; and

Three, that Congress should pass an amendment to RCRA granting EPA clear statutory authority to regulate these tanks.

Nationally, according to EPA, there are approximately 2 million underground gasoline storage tanks, the vast majority of which are unprotected steel, which we have known offers little long-term protection from corrosion. Fifteen years is the expected safe life span for such a tank. After that time, rust problems can be expected to cause leaks from a substantial number of them. About 1 million of these unprotected tanks are, indeed, more than 15 years old.

EPA's draft ground water protection strategy indicates that between 75,000 and 100,000 tanks are leaking right now. Industry experts have suggested that as many as 350,000 tanks will be leaking within 5 years.

Of course, gasoline is not the only hazardous substance stored in large quantities underground. Data from a few individual States confirms this alarming national picture, and I will cite just but a few examples.

The Maine Department of Environmental Protection estimates that 11 million gallons of gasoline are leaking from tanks every year; 106 cases of petroleum contamination of drinking water wells have been reported in Maine in the last 2 years. More Maine drinking water wells are contaminated with petroleum than with any other toxic substance.

In Connecticut, the State Environmental Protection Commissioner has stated that 1,500 tanks in the State are so old that they could leak and pollute ground water at any time. Half of the State's 12,000 tanks are still being used after their normal life expectancy.

New Jersey has about 5,000 service stations. The State Department of Environmental Protection has reported over 600 leaks over the last 3 years, totalling more than half a million gallons.

It is clear that current Federal statutes do not provide EPA with sufficient authority to prevent ground water contamination from underground tanks containing hazardous substances.

In its December draft groundwater protection strategy, EPA initially concluded that it could move to regulate underground storage tanks under TSCA. Since then, the agency has correctly recognized that TSCA is not a fruitful strategy for such authority, and a more recent analysis has indicated that the UIC program under the Safe Drinking Water Act offers EPA the best existing handle to deal with this problem.

We feel, as I think EPA must as well, that this Safe Drinking Water Act approach is also fraught with legal problems which are likely to be insurmountable. It relies on EPA's ability to define an underground tank as an underground injection well. In our minds, "the if only a storage tank were an injection well amendment" strategy is far too uncertain and far too open to legal challenge and subsequent delay to serve as a legislative vehicle for regulating this problem.

Therefore, new legal authority is necessary, and we would propose that such authority include a number of provisions and be modeled on RCRA's subtitle C program.

We would argue that the new authority should be added as a new subpart to RCRA and not to the Safe Drinking Water Act.

We feel that within EPA those personnel involved in the RCRA program have developed the strategies and the type of expertise necessary to deal with the underground tank problem in their work on the underground and above-ground waste problem.

Similarly, subtitle C of RCRA offers a very good model for how to proceed in this area. It is, therefore, our feeling that RCRA is a far better statute upon which to affix such an amendment, far better than the Safe Drinking Water Act, both for its substantive provisions and for the fact that it is being implemented by a better part of the Environmental Protection Agency.

I would like to now briefly turn to some specific comments on the legislative amendment which is before us.

First, we are concerned that section 1453, the performance standards section for operational tanks, does not have an overriding standard against which to measure EPA's regulations. As you are aware, RCRA requires performance standards as may be necessary to protect public health and the environment. A similar public health protection standard should be included here. Without such a standard, for example, it is extremely difficult to determine what the appropriate cleanup and corrective action standards are required in section 1453(a)(4). We simply need some sort of overriding public health standard against which to measure EPA's implementing regulations.

Second, we are concerned that section 1453(a)(2) allows an inventory system to suffice as the leak measurement system for existing tanks. We have heard today a lot about the need for an inventory control system, and that we agree with. However, we think there is a middle ground between leak detection and inventory control, and that is the requirement for periodic tank tightness tests. Such tests are required by States that have looked at this problem before and cost on the average about \$300 to \$500 per tank.

Inventory controls, while they should be the background of any program, can often miss a leak as large as 5 gallons out of 1,000 gallons that pass through the tank. If you assume about 20,000-gallon amount going through a tank, you are talking about a 100-gallon-a-month leak, which is enough to contaminate 100 million gallons of ground water to a concentration of 1 part per million.

Therefore, we would suggest that, in addition to the inventory controls, that EPA be given the mandate to require some type of periodic tank testing procedure for operational tanks.

Third, under the financial responsibility sections, we would suggest that you add the requirement for financial responsibility for corrective action and cleanup. As you know, EPA is currently going through the process of promulgating such financial responsibility requirements for corrective action under the RCRA program, and similar types of financial responsibilities should be required here.

Next, EPA should have the authority to issue design standards for existing tanks. Under the current amendment, there is no authority for EPA under any circumstances to issue design standards for existing tanks.

Fourth, we think that, again in discussing the question of the need for an overriding health standard, that that type of standard must also be included in section 1454 dealing with new tanks. Although that section does now call for design standards for existing tanks, without some sort of overriding public health standard or some standard in terms of minimizing or preventing leakage, it is impossible to judge whether EPA's final design standards meet congressional intent.

Finally, we would like to see the citizen suit provisions similar to those in RCRA included in any amendment to deal with underground tanks.

Finally, if I might add, we have heard this morning about the problem that some people see in this amendment that it might be reinventing the wheel. We would agree with that concern, but don't see that as an overriding problem here. It is our judgment that EPA will take the best out of the existing State programs in promulgating its final regulations and, rather than reinventing the wheel, will be learning from it.

That completes my oral testimony.

Senator DURENBERGER. Thank you very much.

Do you have a comment or statement?

Ms. GREER. No, I have nothing to add.

Senator DURENBERGER. Let me thank you both very much. If you have any additional comments that you would like to make part of the record, feel free to do so.

Thank you very much for your testimony.

Mr. DACH. Thank you.

Senator DURENBERGER. Our next panel is Michael Scanlon, vice president for policy and analysis, National Oil Jobbers Council, representing the Council, the Society of Independent Gas Marketers of America, Service Station Dealers of America, and the National Association of Convenience Stores; William O'Keefe, vice president for health and environment, the American Petroleum Institute.

Gentlemen, welcome.

Your written statements will be made part of the record. If you can summarize them in 5 minutes, you get some kind of special consideration. I don't know what it is, but I'll think of something. [Laughter.]

Michael, you are first.

STATEMENT OF MICHAEL SCANLON, VICE PRESIDENT, POLICY AND ANALYSIS, NATIONAL OIL JOBBERS COUNCIL, REPRESENTING THE NATIONAL OIL JOBBERS COUNCIL, THE SOCIETY OF INDEPENDENT GAS MARKETERS OF AMERICA, THE SERVICE STATION DEALERS OF AMERICA, AND THE NATIONAL ASSOCIATION OF CONVENIENCE STORES

Mr. SCANLON. Thank you, Mr. Chairman.

Today I have the opportunity to represent the testimony of three other organizations, in addition to the National Oil Jobbers Council. They would be the Society of Independent Gasoline Marketers of America, the National Association of Convenience Stores, and the Service Station Dealers of America.

Collectively, these four groups speak for some 150,000 independent small business petroleum products marketing companies. These companies sell approximately 85 percent of the Nation's motor gasoline and about 85 percent of the residential heating oil. Some 40,000 of these companies, it is estimated, would be underground tank owners, and the remainder would be tank operators.

We welcome this opportunity to shed some light on the underground tank issue and its relationship to our Nation's ground water, especially in light of the many unfounded numbers that are being bandied about.

At the outset, it is important to realize that there is no financial incentive for anyone in our business to have a leaking storage tank. Fuel lost is product that we have already paid for and product that we will be unable to sell to our customers.

Independent marketers have a respectable record of underground tank replacement, and there is a main reason for this. During the last 10 years, since the embargo period, the gasoline marketplace has undergone a severe transition. The population of the traditional service stations has declined by some 37,000 outlets since 1977 alone. These stations, for the most part, have been converted to convenience store and large-volume, self-service pumper operations. Such a conversion requires additional underground storage, and these outlets had to be rebuilt starting below ground. Old tanks had to be replaced with new and larger tanks, and more of them. Ten years ago we may have marketed three different fuels through an outlet. Today it is not uncommon to market five different fuels through a market.

With regard to the legislation before this committee, we would tend to agree that a census of underground storage tanks is a good beginning. However, I believe that this committee will discover that fewer than one-half of all the tanks in the country that you seek to discover are located within the confines of the petroleum industry. Your problem is going to be in locating private tanks,

farm tanks, residential tanks, and tanks of all kinds that have been abandoned long ago by companies long gone out of business.

I think you also find that the number of tanks owned by Federal, State, county, and local governmental entities is staggering.

Therefore, we would suggest to the committee that each State conduct a census of its property owners to locate unknown tanks. Such a census could be conducted via an addendum to the annual property tax bill, for example.

We have one particular problem with the tank registration idea, and that would be the reporting of the previous releases of product. The proposed definition of the term "release," as it could be easily interpreted, would require tank owners and operators to report every self-service customer splash or spill or drip, for that matter, and that is something which I think needs to be tightened up a little bit.

Another point we wish to emphasize is what we consider to be a vague jurisdictional authority provided to the States in the committee's amendment. At present, underground tankage is regulated by State fire marshals as a safety precaution following NFPA code 30, which you heard about earlier, or the Uniform Fire Code. Leaving jurisdiction up to the States could result in some gaps and overlaps in enforcement, if a State were, say, to select its own EPA agency or weights and measures division, as opposed to the fire marshal.

Also, I would remind the committee that the OSHA has in place regulations which pertain to underground tankage, and that is also based on NFPA code 30.

The committee amendment I do not believe clearly distinguishes the responsibilities between the tank owners and the tank operators, even though the relationship to the tankage is quite different. We feel strongly that the amendment ought to clearly delineate the responsibilities of a tank operator to be daily inventory control practices and notification to tank owners if those inventory control records stray from the norm. The tank owner, on the other hand, ought to be clearly responsible for tank installation, tank testing upon notification by an operator that records show a problem, and then, lastly, tank abandonment practices.

If a tank is both owned and operated by the same person, all responsibilities of course would fall on that person, but you will find that in many instances that is not the case.

Each person ought to clearly know his responsibilities under the law and where the baton of responsibility passes on to the other fellow.

We also believe that daily inventory control practices are a must for operators of tanks, and program enforcement should concentrate on this activity. No practice or equipment can find a problem faster than proper reconciliation of tank deliveries, sales, product usage, on a daily basis or even on a shift basis.

Enforcement is not spelled out in the regulatory directives contained in the committee amendment. While the amendment does refer, for example, to tank inspection, I trust the committee realizes that there is a problem in attempting to inspect a tank that is underground.

We do not believe an initial or periodic test to be a cost-effective way to regulate underground tanks. Tank testing is an expensive

and time-consuming process. For example, the total tab for a periodic tank test for a four-tank station would be about \$2,000 plus another \$1,500 for the typical outlet in lost revenues during the test period, because you have to shut the station down.

For example, Mr. Chairman, to test just my association, the NOJC association, tanks alone would come to \$230 million every time periodic tests were due. That is a very expensive proposition.

We oppose section 1456 of the committee amendment because, in view of recent court decisions, it would place marketers liable for any and all response-to-leak costs where they might have delivered products to underground tanks at nonretail facilities, locations where my membership would be either unaware of leaks or they could easily be misled as to the condition of the tanks that they're delivering to.

We do support the financial responsibility for sudden and accidental leaks and for slow and gradual leaks. Most of our members are already—virtually all of our members are participating in a program for sudden and accidental leaks, and I would say that Mr. Clay's figures are fairly accurate: not quite half of our members I do not believe have the slow and gradual coverage at this point, although it is a new item in the insurance industry.

In sum, Mr. Chairman, there is no correlation between tank age and leak development. Tanks leak as early as their second year in the ground and as late as their 48th year in the ground. But I think if you look at soil surveys to find out what kind of soil you are putting the tank into, it helps you make a better selection of equipment, as well as proper installation, inventory controls, and testing when you think you have a problem based on inventory controls, proper abandonment practices, and proper response to leak, actions.

I am hopeful that we can find a common ground for a cooperative effort on this issue.

Thank you.

Senator DURENBERGER. Thank you very much.

Mr. O'Keefe.

STATEMENT OF WILLIAM O'KEEFE, VICE PRESIDENT, HEALTH AND ENVIRONMENT, AMERICAN PETROLEUM INSTITUTE

Mr. O'KEEFE. Mr. Chairman, my name is William O'Keefe. I am the vice president of the American Petroleum Institute, a trade association serving 6,000 individuals and 235 corporate members involved in all facets of the petroleum industry.

In addition to my detailed statement, we would appreciate an opportunity to submit specific comments on your proposed legislation after the hearing. We have had less than 48 hours, which is not sufficient time.

Senator DURENBERGER. You all will have as much time as you need, I hope.

Mr. O'KEEFE. Thank you.

Right now I would like to briefly summarize a few key points related to the subject of this hearing.

The importance of protecting ground water is obvious, and API members have been working for years to protect it through their

own actions as well as through cooperative efforts with State and local governments. Let me briefly highlight just three examples:

We provide technical assistance to State and local governments in developing programs to prevent tank leaks and safely handle those which do occur. In Dade County, Fla, for example, we have worked with local officials to develop standards and local regulations which respond to the particular needs of that area. We develop recommended practices which cover everything from tank installation to tank removal. Special emphasis is placed on effective inventory control, since early corrective action can prevent a substance from reaching ground water, and that, of course, is the basic objective.

With your permission, I would like to submit for the record API's most recently approved recommended practice.

Senator DURENBERGER. That will be made part of the record. (See p. 333.)

Mr. O'KEEFE. We also improve storage system standards. Many companies are involved in state-of-the-art replacement programs, installing tanks made of noncorrosive material or cathodically protected steel. Our member companies have spent hundreds of millions of dollars in their upgrading and replacement programs. Obviously, those actions have not prevented all petroleum tank leaks, but we have learned that the words "leak" and "ground water contamination" are not interchangeable. A leak does not automatically translate into contaminated drinking water.

Indeed, while we do not collect statistics in this area, information from some of our members and firms that do clean up leaks suggests that the vast majority of service station leaks are detected and dealt with before they cause a serious problem.

Still, since the focus of your hearing is leaking underground storage tanks, I believe our experience may be of some value. Let me briefly make five points:

First, initial efforts should focus on making sure that the problem is well understood. There is a great deal that is not known. For example, as others have said, we don't know for sure how many commercial-sized, underground tanks there are. Estimates put the total number in the vicinity of 2 million, excluding residential tanks. We are reasonably confident that no more than 700,000 belong to the petroleum industry. There are no validated estimates of the number of leaking tanks, and, furthermore, most leaks from service stations don't affect drinking water resources.

But we do know that contamination of the Nation's ground water supplies from all sources is estimated to be in the range of 1 to 2 percent, and we do know that petroleum products are not the major cause of that contamination. In fact, the major causes are industrial wastes, municipal landfills, agricultural chemicals, and effluents from septic systems. However, those facts do not diminish the seriousness of the subject, and obviously do not lessen the problem of any individual whose water has become contaminated.

Second, everyone who owns tanks should be aware of the potential for leaks since their own actions can prevent them. The petroleum industry has a financial incentive to track down leaks. In addition to imposing an environmental threat, lost product is lost money.

But others may not be aware of the problem. The majority of underground tanks are typically located on farms, in police and fire stations, in headquarters of taxi fleets and rental car concerns. Public utilities own an unknown number, as do a host of other commercial concerns which use them as convenience tanks. Even the Federal Government owns a good many—at military bases, GSA service centers, and at Federal buildings, including the Capitol. In fact, on Capitol Hill there are five tanks. When I asked someone in the Office of the Architect how often they were checked for leaks, he said never. In fact, he asked, "How could they be checked? They are underground."

That, I think, is symptomatic of the need for an educational effort.

Third, education needs to be supplemented by corrective action. We believe that States and localities are the best place to begin, and they are beginning. Some 19 States control tanks, and a growing number of localities have ordinances to deal with the problem. We are working with many of them.

Fourth, to the extent that national legislation is adopted, it must be comprehensive. This issue transcends the petroleum industry. The potential danger from underground tanks comes from nonindustry tanks as well as those in service stations. Any solution has to cover everyone. There should be no exceptions, no exemptions.

Fifth, if Federal legislation is enacted, we strongly believe that it should be rooted in the concept of equity. Those who control tanks that leak should be accountable for the cost of whatever damage is caused. Those who have taken the initiative and who have acted responsibly should not be penalized.

Finally, we do not believe Federal legislation is appropriate. It is hard to develop a remedy when many aspects of the problem are still unknown. At this point we think the best approach is to gather facts, make people aware of the problem, make them aware of what they should be doing, and help the States with their programs. In that context, the efforts of the petroleum industry may serve as a model.

Thank you, Mr. Chairman.

Senator DURENBERGER. Thank you very much.

I am going to have to leave here shortly. Since I do not have any help here, you are all going to get a 5-minute break.

Let me start with a couple of comments and observations.

One, even though my grandfather was an oil jobber, and so I am more likely to come down on the side of jobbers than I am the oil companies, we need some resolution between you experts as to whether or not we ought to take your advice, Mike, which is that we need some national standards and that sort of thing, and yours, which is let's do everything locally. That is not quite the way it was stated, but I did get that message. It would be helpful if, given a little time on this one, if you could, representing the petroleum-related business out there, if you could give us some advice.

Second, this is my advice to you, I suppose. This gets at the whole issue of founded versus unfounded statistics. We have to use statistics to illustrate what some people tell us is the problem. You have to use statistics to assure us that you know that there is a

problem out there. If you give us nothing at all, it sounds as though the folks that ought to know something about this don't.

The reason for that, I suppose, as I think, Bill, you accurately indicated, even though you might be 1 or 2 percent, or even less than that, of the ground water problem, you are part of the problem. Sooner or later somebody is going to put you on television, and then you've got an EDB problem all over the country. That is obviously what, with this series of hearings we are trying to avoid in this whole process.

I think those of you who know me know that I am pretty much of a marketer in terms of the approach to solving problems. If you look at the proposals on acid rain, I am not the regulator; I am the marketer. I am the guy that says we ought to tax emissions and use that to control the problem, rather than telling everybody you've got to do this, this, this, and that.

You go over on the health side and you will find that also there I feel strongly that with the right set of incentives in place and the right process for setting standards that the marketplace in a way will work. When you get into an area like this, it becomes a little bit more difficult, and that is why one of the witnesses we had here earlier was representing sort of the embryonic insurance business.

It strikes me—and maybe each of you might have an observation—that if you had the right set of responsibilities in place, and you talk to the owner versus the operator, and so forth, but if we had the right set of responsibilities in place, and then on the governmental side we said responsibility to protect what from what, so we have some kind of a public health standard, as several people have testified, then it seems to me that there ought to be some important role for the insurance system in this whole process, as opposed to the Government stick inspector or something like that just knowing that there is a financial liability out there and they ought to help.

I do not know what the answers are. I am just throwing these back at these witnesses and others to help us do some thinking about this problem.

But just dealing with the whole issue of individual responsibility—the owner, the operator, and so forth—would either of you have some advice for us on the issue of the role that insurance should play?

Mr. SCANLON. Mr. Chairman, I would indicate that we have as much incentive as anyone to remove the bad actors from our industry, the fellows who are not maintaining inventory records and don't really give a darn about what happens to any leakage. You will find that it is usually tied to his financial involvement with that product.

For us, that product is the lifeblood of our business. If you have a person who is not a tank owner and does not really own the product, let's just say he pumps gasoline behind a garage for a bulk-end user, filling up fleet trucks or something. That individual does not have a financial tie to that product in the ground. Therefore, he is not really going to care if it is off 20 gallons, or he is probably not even measuring to begin with.

We find that we have this financial tie to our product. If we lose that product, that is money right out of the bank.

So by eliminating the bad actors in the industry by coming down tough on enforcement, especially on inventory control, we can lower our insurance rate. I am confident we can, because right now we are paying through the nose in some instances for this kind of slow and gradual leak insurance.

I think as the industry finds out what the risk factors are and what the leakage figures might be, I think you will find if you have a good program in place, you are going to be paying the safe driver type of policy premium. You are going to get a lower premium. We would like to see that happen.

Senator DURENBERGER. You don't want to leave this as the consumer, or the next-door neighbor, or the drinker of ground water having to sue somebody. You want those risk relationships between the person who is utilizing the tank and somebody else in this process, so that I, as the consumer or the next-door neighbor, do not have to go get my lawyer and then spend a whole lot of my money.

Did you want to add something?

Mr. O'KEEFE. I just want to add two things, Mr. Chairman. The reason that we stress enforcement at the State level is that our experience has shown that the conditions in the States, the location of the aquifers, soil condition, and so forth—there are a lot of very site-specific factors. We have our recommended practice. If every State adopted that as a regulation, we would endorse that.

Second, if Congress could only pass legislation containing two elements, we would support one of them being mandatory insurance or demonstrated financial responsibility, and, the second being a requirement for effective inventory control.

Senator DURENBERGER. I thank both of you. Thank you for your testimony.

If you have additional comments that you want to have as part of the record, feel free to do so within the next couple weeks.

Mr. SCANLON. Thank you.

Mr. O'KEEFE. Thank you.

Senator DURENBERGER. We have four more people from whom to hear. One is Glenn Affleck, and the other is a panel.

At this time I am going to have to excuse myself, unfortunately, for probably about 10 minutes, so that I can get in two votes in a row, and then get back here as quickly as I can.

We will recess the hearing. Thank you.

[Recess.]

Senator DURENBERGER. The hearing will come to order.

Glenn Affleck, come on up.

I appreciate your being here. Your testimony will be made part of the record.

We appreciate your taking the time to come and testify.

**STATEMENT OF GLENN AFFLECK, TECHNICAL REGULATIONS
MANAGER, HEWLETT PACKARD CO., AMERICAN ELECTRONICS
ASSOCIATION, PALO ALTO, CALIF.**

Mr. AFFLECK. Thank you, Mr. Chairman.

I am Glenn Affleck, technical regulations manager for Hewlett Packard Co. I am appearing before you today on behalf of the American Electronics Association.

AEA now represents 2,400 companies nationwide. Seventy-two percent are small companies employing less than 200 people.

We appreciate this opportunity to discuss the issues of underground storage of hazardous materials. We would like to share with the committee the collective experience of the many AEA member companies that have facilities in California.

That State has perhaps the most extensive rules and regulations governing the use of underground storage tanks of any State in the Nation. The growing body of knowledge and experience in California should be useful to EPA in formulating its regulations on underground tanks and to Congress in formulation of any new legislation that may be needed.

Our industry has worked actively in California with local officials in developing a hazardous material storage permit ordinance in Santa Clara County. This model ordinance has been adopted by numerous cities and counties in the State and formed the basis for statewide legislation passed in 1983. We are now working with EPA on a regional study that will be looking at underground tanks as a permanent part of the comprehensive overview of air, ground, and water environmental concerns.

EPA will be looking closely at the local, State, and Federal Government jurisdictions for environmental matters with an eye toward suggesting a streamlined approach for dealing effectively with underground tanks as well as other environmental concerns.

Since we have had only a few days to review Senator Durenberger's amendments, we are not prepared just now to offer detailed comments on its provisions. I think my generalized comments on California activities will be seen to relate directly to the thrust of the amendment.

AEA would be pleased to submit specific comments on the proposed legislation for the record at a later date, if the committee desires it.

Senator DURENBERGER. Please feel free to do so.

Mr. AFFLECK. We will. At base, however, while we fully support the adequate regulation of underground storage tanks, we question the need for additional Federal legislation at this time. In an effort to explain this fundamental position, I might suggest an analogy to you.

We in the electronics industry have been a test case for managing the malady of underground tank system problems. We, no doubt, are not the sickest patient, but our illness has been diagnosed with the greatest specificity; that is, leaking tank systems stand out as our sore spot.

Like a medical researcher, the State of California has prescribed several medicines for us and others in a sort of test group. We can tell you how the medicine we are taking tastes, and it doesn't taste all that bad, but there is a lot of it. We and our doctor, the State, cannot really tell you how well the medicine works, at least in its initial form.

I might add as an aside that considerable AEA effort has been directed toward passing samples of the new medicine around the Nation, so that a broad base of electronics companies can try all of it or part of it.

But the point is that the clinical trials are not yet over, so it may be a bit premature to recommend the medicine for distribution to all patients everywhere. I base this feeling primarily on 2 things: one is the experience we have had, are having, with California buried tank regulations, which I will describe to you in a moment.

The second, perhaps most important, is our understanding that EPA itself believes that it already has the statutory authority to deal not only with hazardous wastes, which are exempt from this amendment, but also with unused hazardous materials, which this bill focuses on specifically.

Evidence for this EPA responsibility, in addition to the environmental study in California, is the recently embarked upon agency study which will examine the complex issue of underground storage of chemicals over the next two years on a nationwide basis.

In our view, therefore, any new legislation that attempts to enact in rapid fashion comprehensive regulations of literally millions of underground tanks in the United States would be proceeding without the needed foundation of basic information on the subject.

In order to frame the best possible legislative or regulatory program, our California experience has shown better data may be needed in a variety of areas. These include—and I will be glad to discuss examples of some of these points after my testimony, if you wish:

One, which types of tanks are most prone to uncontrolled release?

Two, is it necessary, or even feasible, to regulate every tank in given geographic areas, or are there only certain high-risk categories that should be addressed?

Three, what are the respective contributions of tank design, installation, operation, and maintenance to accidental release of tank contents?

Four, what are the alternative technologies in terms of cost-effectiveness, feasibility, and efficiency of tank containment, monitoring, inspection, and, where needed, corrective action.

I might add here that the new situation in California has stimulated innovative concepts to address many of these areas with ideas coming from companies throughout the United States, and even from other parts of the world.

Lastly, five, what is the total number and distribution of underground tanks throughout the country?

In my time remaining I would like to recap for you briefly the sequence of events in California regarding underground tank regulation from the perspective of the electronics industry.

It was actually several AEA member companies that first detected the fact that underground chemical storage tanks had a tendency to leak. Fire regulations had required tanks used to store flammable liquids to be buried. In the 1979-80 timeframe, a handful of companies were working on a case-by-case basis with the Regional Water Quality Authorities to begin to characterize the individual problems, including extensive geological investigation, and to make some attempts at cleaning up the escaped material from the environment.

More companies involved in that early stage began to implement their own improvement in internal systems that monitor tanks.

Several electronics companies soon thereafter abandoned the use of buried tanks for chemical and waste storage and replaced them with vaulted tanks that can be physically inspected.

It was the discovery of chemical contamination in drinking water wells that led to the more comprehensive investigation of tanks in the Santa Clara County area by the Regional Water Quality Board.

As you know, leaking underground tank operations were found to be a common phenomenon. The investigatory stage of the San Francisco Bay Area Board activity ended last summer with further characterization of the problem through studies commissioned by companies owning the tanks.

In many cases, subsurface cleanup operations continue at this time.

Since the initial regulation that put the tanks underground was related to fire protection, fire chiefs throughout the county began working with loan executives from industry to develop a model ordinance that cities throughout the county could adopt to deal with the storage of hazardous materials. Please note that this ordinance applies not only to buried tanks, but to above-ground storage facilities for listed hazardous materials.

The ordinance addressed construction standards for storage tanks. It required secondary containment for newly installed tanks, with monitoring systems between the two levels of containment. For existing tanks, it required rigorous monitoring and discontinued use of a tank if a leak was detected. It specified reporting requirements on what is stored, inspection requirements, recordkeeping requirements, permitting procedures, and spill reporting guidelines.

The two main concerns with the ordinance, in our industry's view, are the uncertainty that the best tradeoff will be reached between fire hazard protection and ground water protection requirements for the storage of flammable liquids, and, secondly, that the copious paperwork associated with the ordinance is going to be truly useful and worth the effort it takes, both by industry to compile it and by the public agencies to process it and store it, given the lack of expertise in this area that exists at the local level.

I would like to give an example of the first concern, to further elaborate it. The example involved a new installation of a flammable solvent tank. The vault for the tank was built similar to the example shown in the ordinance guidelines and coated with a solvent-resistant material. For adequate fire protection, the fire inspector suggested that the vault be backfilled with pea gravel and buried the tank inside the vault.

The ordinance calls for monitoring the space between the tank and the secondary containment. An adequate, reliable system to monitor for leaks through the pea gravel was not available. Visual inspection was preferred to backfilling with pea gravel, given the present state of monitoring technology.

Cleanup of spills or leaks into the vault filled with pea gravel poses problems, but leaving the vault open raised new areas of concern. The open vault around the flammable container created new fire protection requirements. Combustible gas detectors, heat detectors, ventilation system, and a fire suppression system were required by the fire department. All of these additional requirements

may not be appropriate for the degree of risk posed by the mix of solvents involved.

The ordinance also requires analyses of storm water in a secondary container before discharge. To avoid the nuisance and high cost of frequent storm water analyses, a roof was built to prevent rain from entering the open vault.

In conclusion, this example, the total cost of this installation was about \$140,000, or seven times the cost of a simple buried tank.

California Assembly bill 1362, as passed, is limited only to the regulation of buried tanks. It departs from the model ordinance in that it is less restrictive on the installation and monitoring of motor vehicle fuel storage tanks. A laudable feature of the bill is that it attempts to set statewide standards to reduce the local variation that inevitably would occur in the model ordinance implementation. In our opinion, the bill did not succeed entirely on this point.

Also, the bill calls for the computerization of all data generated by the reporting requirements. Funding and manpower required by the passage of this legislation are at this time a real problem for the State agencies charged with implementing it.

Rather than going into further detail on the California legislation, I would prefer to end with an overview that these mechanisms are just beginning to be tested. A vast amount of quantitative measurement of the controls these measures bring remains to be done.

Certainly the activity in California has raised the awareness level of the issues associated with underground tanks and has mobilized considerable industry effort to deal with them.

The California measure may not have been in effect long enough to fully develop national legislation, if such legislation is needed to augment existing statutory authority. We felt it would be prudent to permit the entire system in California to operate to determine if the medicine prescribed for the patient is going to effect a cure, produce side effects, or act only as a placebo.

I would be happy to answer any questions.

Senator DURENBERGER. Thank you very much.

I guess the message I got from that testimony is that, even though we are all aware of the problem, and you have had some experience with it, that it might be costly to act too quickly. Is that sort of the bottom line?

Mr. AFFLECK. Yes.

Senator DURENBERGER. Let me ask that question in a slightly different way. Part of the amendment that I introduced requires EPA to promulgate new tank performance standards within 270 days. This is under the heading, "Technology Requirements for New Underground Storage Tanks." Do I read your experience and your testimony to say that, even with regard to standards for new tank performance, that we don't have enough information to act?

Mr. AFFLECK. Yes. I think there is a lot we do not know. For example, we were told that there was no problem monitoring through the pea gravel, to monitor for a leak, a solvent leak, into the pea gravel; that there was such a thing as a vapor monitor. We cannot find one that we can have somebody say is going to be reliable

enough to detect a leak. Yet, people would say that would be a good standard.

I think there is a lot to be done engineeringwise to come up with solutions.

Industry will put into place the solutions to get out of the problem if it is available. We haven't found it.

Senator DURENBERGER. Is there, to your knowledge, a way for us to construct—perhaps I may not be using the right terminology—but, in effect, some sort of performance standards for leak detection systems, that in effect would encourage and produce adequate detection systems in this country?

Mr. AFFLECK. To me, that is sort of the technology-forcing kind of thing. I don't know—the debate on that—in California, just the fact that there is an ordinance there has gotten people trying to invent. From that point of view, there are some things going on, but whether or not they can do it by a deadline is the real question.

Senator DURENBERGER. I understand you have not had a lot of time. However, I would appreciate it if you can take the time to look over the amendments on this side and the bill on the House side, and provide the reaction of your association. That would be very helpful to all of us.

Thank you for being here today.

Our final panel is James Pim, associate public health engineer for Suffolk County Department of Health Services; William Burgess, chief of the spill resources division of the Water Resources Administration, Maryland Department of Natural Resources; and Robert McVety, administrator, solid and hazardous waste section, the Florida Department of Environmental Regulation.

Gentlemen, if you will all come forward and lavish on us your expertise and your experience from your States, we would appreciate it a great deal.

You have written statements, I understand, which will be made part of the record. You may proceed to summarize those, if you would.

Let's start with Mr. Pim.

STATEMENT OF JAMES PIM, ASSOCIATE PUBLIC HEALTH ENGINEER, SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES

Mr. PIM. Mr. Durenberger, I am pleased to respond to the request to appear here. These comments were prepared before I had an opportunity to read the amendment, and we probably will have more comments to send in later.

Suffolk County, under the direction of County Executive Peter Cohalan, has had a strong program of hazardous materials storage and handling control since January 1980, when article 12 of the Suffolk County Sanitary Code went into effect. The code was passed by the local board of health after several years of preparation in response to a steadily increasing rise in the number of reports of public and private well contamination, leaks, spills, fires, and accidents involving chemicals and petroleum products.

The ground water which supplies the 1.3 million people of the county with their daily needs derives solely from precipitation which falls directly on the island and soaks quickly into the porous

sandy soil. It is especially susceptible to contamination from any foreign material which is deposited on or into the ground.

Long Island has been declared a sole-source aquifer area.

As detection capability as improved, more and more chemicals have been found in Suffolk County ground water. The list now includes over 31 organic compounds.

A total of 678 private and public water supply wells have been contaminated with chemicals other than pesticides. Over 2,200 have been contaminated with pesticides.

Petroleum spill incidents since 1978 have totaled over 1,500. There are 18 recovery operations in place at the present time removing gasoline or fuel oil from the surface of the ground water.

These statistics would seem to indicate that Suffolk County has exceptional problems with ground water quality, but in fact the reverse is true. The ground water quality of the county is still generally excellent. What the statistics are actually indicating are the results of a very strong and complex program of local environmental investigation and management which is aimed at preserving and protecting the ground water quality for all time.

Dr. David Harris, commissioner of the department of health services, has directed the development of a bold ground water management program which started years ago with the vigorous enforcement of the State pollutant discharge elimination system permit program. This was followed by a detergent ban and a cesspool additive ban.

Article 12 then followed to control the storage and handling of toxic and hazardous materials. The most recent proposal to be introduced, article 7 of the sanitary code, is an attempt to regulate the location of activities that require the use of toxic and hazardous materials.

Research has disclosed that the central part of Long Island is the area most critical for ground water protection. In this area precipitation penetrates deeply in a near vertical direction, down to the lowest areas of the aquifer where the major water supplies are located. Water entering the ground in this region takes hundreds of years to finally reach the sea moving at about a foot or less per day.

The decision has been made, first at the county level and now at the State level as well, that the only way to permanently protect the ground water reservoir of Long Island is to provide extraordinary protection to these deep recharge areas by treating them like the drainage basins surrounding surface water reservoirs. That is, by completely excluding from the critical areas activities which use or store toxic or hazardous materials.

Though this is normal practice for surface impoundments, it seems to be a revolutionary concept in this country when applied to ground water recharge areas because some people say that it infringes on the zoning rights of local government. In Europe, however, it is a control approach which is being addressed.

Suffolk County is not unique. Rather, it is a microcosm of innumerable areas throughout the Nation wherever a significant ground water aquifer exists, available for present or future water supply.

Suffolk is different only in that more money has been spent on ground water research and analysis than most places, and a vigorous program of control has been developed. The problems are no worse in Suffolk than most other places; they were just discovered earlier.

Most areas of the United States do not have the means of investigating and protecting ground water at the local level the way Suffolk County does, and most aquifers are not confined within one political jurisdiction. It is, therefore, essential that protection be provided at the national level with the provision that authority may be passed to the State or local level where appropriate. The Resource Conservation and Recovery Act is a reasonable vehicle for creating required legislation, but because of the complexity of the matter, a separate groundwater law might be more manageable.

Regardless of how it is organized, any program should go far beyond just a simple tank law. Tremendous sums of money will be required to upgrade storage facilities and the Nation cannot afford to spend it inefficiently. On the other hand, neither can the Nation afford to allow the ground water resources to be contaminated. The most sensible approach to the problem is to provide varying degrees of control over the storage and handling of toxic and hazardous materials, depending on the threat the area poses to ground water quality.

The Nation's aquifers should be accurately mapped and their critical recharge areas defined. Zones of protection should be established taking into consideration the characteristics of each aquifer. The highest level of control should be over the main recharge area of each aquifer and surrounding well fields. This should involve the complete exclusion of the use of materials within the zone which could contaminate the aquifer. Industries using chemicals should not be allowed to locate there.

A second level of protection should apply to most other areas of the country where ground water is present. In these zones any activity would be allowed, but toxic materials would have to be stored in high quality containers and existing facilities would have to be upgraded. Probably the double-walled containment philosophy would apply, and control would be similar to that provided in Suffolk County by article 12 of the Suffolk County Sanitary Code.

Finally, there should be a third zone category where storage of toxic materials poses only minimal threat to ground or surface waters and extraordinary controls are not necessary. Here existing facilities could continue to be used as long as they remained sound, and standard, single-walled construction could be used for new facilities as long as they were built safely and protected against corrosion.

A program of this type is far reaching and practical. It puts limited resources where they can do the most good and provides a permanent solution to a rapidly growing national problem. It addresses all types of toxic and hazardous materials and all types of storage and handling. Money that is spent is in the form of capital improvements. Risks and, therefore, liabilities are reduced and operating conditions are improved. Authority for enforcement can be passed to the States, as with other pollution control laws. Fees can be collected to support the program through a tank registration re-

quirement. The services of the Geological Survey will need to be enlisted to map the aquifers.

Of course a plan of this type will present major difficulties where development already exists over recharge zones, and in those areas compromises will have to be worked out on an individual basis. These compromises may range all the way from a program of phasing out all noncompatible uses to the other extreme of writing off certain portions of an aquifer as being too contaminated already and not worth reclaiming.

Anything short of a complete program of this type on a national basis will be inadequate and doomed to failure. European experience should be studied carefully, since this subject has been under serious consideration there for nearly 20 years.

Now I also have a brief explanation of what our code is, article 12, which I can give in a capsule form.

Article 12 of the Suffolk County Sanitary Code is a law passed by the county board of health under their authority which derives from the New York State health law. It is administered by the Suffolk County Department of Health Services under the direction of Commissioner David Harris. It provides standards of construction and operation for all types of facilities for the storage and handling of toxic and hazardous materials. The definition of such materials is very broad-based and includes nearly everything that could contaminate ground water.

In preparing the law several years ago, no models could be found in this country to follow since no one else had adequately addressed the problem. Subsequent investigation of European practice disclosed that many very strict laws were in effect and had been for several years, but great difficulty was experienced in obtaining copies and translations. Article 12 was, therefore, developed using commonsense and the best information available.

A basic concept of double-walled containment was applied throughout the law as being the most practical way of obtaining maximum protection. Then, as a matter of compromise, one major exception to that philosophy was allowed for underground petroleum storage, where single-walled tanks were permitted if made of noncorrodible materials and if provided with leak detection and overfill protection devices.

The law covers above- and below-ground tanks, indoor tanks, portable container storage, transfer facilities, and pipelines. Transportation is not covered since it is the jurisdiction of State and Federal departments of transportation and not easily controlled by a local jurisdiction.

All tanks are registered and computerized, and a small registration fee collected. About 6,500 tanks have been registered so far. All plans for construction are reviewed and approved by the health department, and a small plan review fee charged. About 1,700 new tanks and other facilities have been constructed so far to meet the code.

The law requires that all new construction meet the code standards and that all existing facilities be upgraded by 1987 for chemicals and by 1995 for petroleum.

Senator DURENBERGER. Are you getting near the end of your statement?

Mr. PIM. Yes, sir.

This means the replacement of nearly all underground tanks and major improvement to all other facilities.

During the interim period before replacement, all tanks must be tested periodically, using an approved method, by testers licensed by the county health department. The testing frequency varies from 2 to 5 years, depending on age of the tanks. About 2,400 tanks have been tested so far with an average leakage rate of about 7 percent. The leakage rate, including the associated piping systems, is about 22 percent.

Also, that has dropped through the years from initially around 15 percent to 4 percent this last year. So, apparently, we are succeeding in eliminating our worst quality facilities.

Abandoned tanks must be filled in with soil or removed.

For underground petroleum storage, Fiberglas, Fiberglas-coated steel, or cathodically protected steel tanks are allowed.

For double-walled installations, factory-manufactured, double-walled tanks are used or single-walled tanks installed in concrete vaults. Double-walled tanks have been manufactured in Europe for many years and are available on the American market. Double-walled tanks are also just now beginning to appear from American manufacturers to meet the new code requirements. A leak detection system is required between the walls and various systems of vacuum, pressure, or level detection are available.

Piping systems must also be double-walled or laid in utility galleries except for petroleum products where noncorrodible single-walled construction is allowed.

Above-ground tanks must be built within an impervious, diked enclosure so that no ground penetration of spilled product can occur.

Existing terminal tanks must have interior bottom plates sand-blasted and coated with an approved epoxy or other coating system and reinspected every 7 years.

Drums must be stored in approved facilities with impervious dikes and floors and protected from the weather.

Bulk-stored dry chemicals that could leach if exposed to precipitation or fire fighting water must also be adequately protected.

Enforcement of the code is by the very efficient use of compliance conferences and consent orders followed, if necessary, by formal administrative hearings and commissioners' orders. On rare occasions, when circumstances warrant it, cases are referred to the district attorney's office for criminal prosecution. To date, 367 cases have been processed with a total of over \$125,000 in penalties assessed and nearly \$300,000 in penalties suspended for satisfactory completion of remedial action.

In summary, the article 12 program has been an exceptionally successful effort with efficient enforcement and minimal commitment of additional resources. In fact, the program was successfully initiated with no additional personnel, though it now has grown to where several new positions are needed. The law has proven to be a useful model for several other jurisdictions around the country where action to control ground water contamination problems is rapidly increasing.

Senator DURENBERGER. Thank you very much.

Mr. Burgess.

STATEMENT OF WILLIAM S. BURGESS, CHIEF, SPILL RESPONSE TEAM, WATER RESOURCES ADMINISTRATION, MARYLAND DEPARTMENT OF NATURAL RESOURCES

Mr. BURGESS. My name is Bill Burgess. I'm with the Maryland Water Resources Administration. We are the agency in the State of Maryland that takes care of petroleum contamination problems.

We have prepared a written statement, which I have submitted today. I am not going to speak from that statement, but I am going to capsulize some of my statements in it and try to keep my testimony as brief as possible.

First off, I would like to comment on the scope of the problem. We have heard quite a few facts and figures here today as far as the number of tanks that may be involved in leaking problems and how many actual leaks we have around the country.

We do keep inventory records of these types of problems in Maryland, and one of the things that we are most concerned about is the increasing frequency. I have submitted information in my report and also made an attachment with our computer summary from several fiscal years, which show that in fiscal year 1983 we jumped in the number of problems by over 100 percent from the previous year. In this fiscal year, 1984, we have also come up to nearly what we had in fiscal year 1983. Therefore, we expect to come up to almost a 100-percent jump by the end of this year. So we know the problem is increasing, but we try to look at what the reasons for the increasing nature of the problem are.

We know we have always had underground leaks. Part of the reason for the increase is the fact that we do have better education of the industry as well as private companies that have these types of tanks. They are more aware that the reporting requirements are there and that they have to comply with them.

Along with that, we also have active enforcement of the reporting requirements. In fact, we are filing criminal charges in district court in Maryland against one oil company representative for failure to report a leak, and we are considering filing charges against another right now. So this type of enforcement activity will also increase the amount of leaks that are reported to the administration.

When we look at the reasons as to why underground leaks exist, most people agree that steel tanks have had a problem because of age; from prosperous times in our country in the fifties and sixties when we had a great increase in the number of service stations as well as other types of facilities; and the fact that these tanks have reached generally what we consider their service life.

The thing that scares us most, I think, in this day and age when we have the technology to prevent spills is faulty equipment or faulty installation.

We see time and time again where equipment is listed as faulty. In fact, we have one reference on our report that states one manufacturer provided fittings for underground tanks with an 80-percent failure rate. This is a great problem that we really do have to address.

Another problem we have in this area is the faulty installation. I have made an attachment of four cases we have had since December 1983, with tank systems that have had faulty installation problems. Most have been in lines, and have created leaks up to about 2,500 gallons that we can document. We are very concerned about these areas.

Another problem that we are looking at now is chemical incompatibility. That is becoming a very serious consideration in the industry. Primarily, methanol is the one that concerns most people as far as chemical incompatibilities, and that goes with all types of tank systems. It is not one particular type of tank system, because any of them have the rubber fittings and the pumps and things like this that can be attacked. We may see a need to address in the future, what blends of methanol and other chemical additives can be used for gasoline.

The next issue we always look at, is what types of facilities are involved in underground leaks. We think that, from our experience in Maryland, the service station is always unfairly zeroed out as the most likely facility to have an underground leak. The simple fact of the matter is they have a lot of storage, but they deal with gasoline primarily, and gasoline always causes a more immediate problem than what we see with the fuel oil storage, normally in terms of underground contaminations.

We have constant problems with facilities such as schools, churches, private homes, service stations, office buildings, apartment buildings, government facilities, and any other business that has oil or gasoline storage. They are all at risk as far as contaminating the environment goes, and our regulations are geared toward all those types of facilities.

Basically, I was asked to speak to what Maryland is doing to address the issue of underground leaks. Primarily, to prevent underground leaks, we are rewriting our regulations. We have been involved in this activity for about 2 years now. Once we became seriously involved in it, we found that it was a very, very complex issue, and it did take quite some time to address everybody's concerns and try to come up with a resolution to the problem that we can all live with.

We tried in 1978 to improve our underground regulations, but we found that we did not have enough good data from facility leaks and we also did not have the support of the public in general, because the problem had not manifested itself to the level that it has today. So, we were not successful in our attempt in 1978 to promulgate regulations.

We sat back and collected data through a series of computer report systems that we have, tabulated a lot of information, and we have been able to defend our position that regulations are needed in Maryland. We expect these regulations to become effective in late May. They provide for the following general types of things as far as underground leaks go:

Specifications for storage systems is the one thing that you will find that is in common with almost every other jurisdiction—what types of tank systems should go underground. We are concerned not only with the tank, but also with all the associated piping be-

cause several important sized leaks have come from just the piping and not the tank itself.

We are also concerned about testing requirements for brand new storage systems when they are installed, to make sure they are put in right.

We have a mandatory testing schedule, and we are in disagreement with the industry over this issue. The reason is that we feel mandatory testing is good backup to the inventory system, for which we have documented several failures even when it is kept in a fairly good manner.

We also have requirements for the bulk inventory control because we do believe it should be kept at facilities. We have requirements for monitoring wells in the installations. We have procedures to be followed in the event of a leak; color-coding requirements to prevent mixed-up deliveries, which is not really an underground leak problem; requirements for abandonment of tanks to be done in a proper manner; and also requirements for the interior lining of storage tanks if they have previously had leaks and the people want to keep them in service by that method.

We have had a lengthy review process, as I mentioned, with these regulations. We have worked with the Maryland Petroleum Council, the National Oil Jobbers, also the Greater Washington and Maryland Service Station Association, and other groups, including petroleum operations engineers.

We think we have a set of regulations that everybody can live with, that will prevent leaks in the future, although the effect of that series of regulations will not be seen for several years.

In terms of response to underground spills, my administration does respond to these types of incidents. We issue orders for testing and corrective actions at these types of facilities when we become involved in them. We have investigative work that we have to do. We actually go out and put in the observation wells ourselves when we are looking for the source of some of these leaks to trace them back to the spiller.

One of the things that we see as a great problem for the regulatory agencies in this area is the excessive requirements for manpower. We are not talking man-days; we are talking man-months to solve many of these underground leak problems. In fact, we have personnel on our staff that are dedicated to only this problem. They do nothing else in terms of oil spills.

One of the things that we see in the area of preventing oil spills and also in the response to them is education which really pays off. When we inform the public of what the potentials for these problems are, how to go about taking care of them, and put them in touch with the right types of people, we see very positive benefits.

Examples of this are that we have held three workshops in about the last 1½ years in Maryland, and we have seen where the people who were invited as speakers, have been asked to come back to the industry groups and speak again. Also, they have been hired by some of the industry people to follow up on their problems.

One of the great problem areas with underground spills is the fact that essentially the organized response to underground spills is a new field, and a lot of people may take issue with me on that

statement, but I feel fairly confident in saying that, when I use the word "organized."

We have had problems with technology, being the equipment and the techniques to handle these problems, in the past, although we are coming along at a fairly rapid pace right now.

Until the mid-seventies, no one had pumps to recover product from the ground that would handle both water and petroleum products and also be explosion resistant. The techniques for organized response just were not there. We have helped develop these areas.

We find that a lot of people in the industry talk around a little bit, which has been very helpful in the development of techniques to clean up these problems.

The fact that cleanup takes a long time is a major problem. We have had several incidents in Maryland that have gone over 10 years in the cleanup operations, and we expect them to go much longer than that. A lot of people do not understand these types of problems when we are dealing with underground leaks.

The costs for cleanup are large, and litigation can be even more costly than the cost for cleanup. We look at the average small leak from a service station, or whatever, and find that it costs on the average about \$1,000 to \$3,000 a month to maintain the recovery systems. But, we have litigation in which one major oil company had an award against them of \$1.82 million in Maryland recently. We just had charges filed in another county that have asked for \$18 million in damages. So this is a very expensive field for the industry.

Also, abandoned tanks, as we have heard earlier, complicate the investigations and are sometimes the source of underground leaks. So we are very concerned about the effect of abandoned tanks, and also the involvement of regulations to remove this as a possible source for us.

The last thing that I want to really address is suggestions for the Federal involvement. Basically, I would like to make a quick comment on the legislation. Again, detailed comment is in the statement.

The situation about notification of abandoned tanks to the State government is good, but we should also require the facilities to abandon them properly, not just notify people of their presence.

Also, with regard to the tank registration program, I think we have to consider what the goals of the tank registration program would really be in order, to find out whether it would be an effective measure or not. What is really the end product of a registration program? If it is to be used to obtain information, so that the regulations can be enforced, that is fine.

However, I understand that possibly one of the provisions would be to have the States implement a registration program under obligation to the EPA. It would be impossible for the State of Maryland to incorporate this registration program into one of its existing programs right now without funding assistance, because of the workload that we are involved in right now—we just do not have the manpower or resources to get involved in that.

Then as far as performance standards for new tanks go, the banning of the use of plain steel and the requirement of the leak detec-

tion devices, we applaud these moves. We would urge you to proceed with the utmost of speed in developing regulations along this line. I think this is consistent with everyone else's regulations across the country.

The mandatory slow leak insurance, I feel is a good concept because the cleanup of these problems is usually beyond the capability of the small businessman to handle. I have been involved with quite a few of these things and had these types of problems where the people just could not afford to take care of the problem. They have had to close. We had one individual threaten the other day to hang himself from a tree if we could prove that the problem was his, and, unfortunately, a few days later we did prove the problem was his. I haven't seen anything in the papers since. However, we are very concerned about that.

We also have a few other points which I would like to have considered:

First, funds for implementation of an obligatory program to the States—I would like to inform you that in the State of Maryland we have a division of responsibility. I am sure many other States are the same. We have hazardous material control in one department. We have petroleum spill control in another. This is a consideration in any bill that would be proposed on leaking underground storage tanks.

I think the last thing that I will make a statement on is that, in my opinion, research grants should be set up to investigate techniques to allow people with contaminated wells to get clean water, a water treatment system that would be a good one. We have treatment systems that are available on the market, but most of them are not as good as they could be. Most of them do not have any performance standards for them, and we do not know if they are going to work. They have to be continuously monitored and sampled. Again, I speak to that in the report. However, I think some areas such as this could use some more work.

In closing, I would just like to say that the State of Maryland is very concerned about the underground leak problem, and we stand ready to help in any way that we can—in review of the regulations or comments. We will be as candid as we can on any matters.

Senator DURENBERGER. Thank you very much.

Mr. McVety.

STATEMENT OF ROBERT McVETY, ADMINISTRATOR, SOLID AND HAZARDOUS WASTE SECTION, FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Mr. McVETY. In the interest of time, I will keep my oral testimony brief. You do have my complete written statement.

Senator DURENBERGER. That is what Mr. Burgess said, too.

Mr. McVETY. I promise.

Senator DURENBERGER. Go ahead.

Mr. McVETY. Florida residents have a deep interest in protecting their water supplies from contamination by toxic substances. Over 92 percent of Florida's citizens get their drinking water from the ground water. The State's ground water supplies are especially vul-

nerable to contamination, due to our high ground water table and porous soils.

During the past 2 years Florida has experienced an increasing number of occurrences of ground water contamination from leaking underground storage tanks, particularly gasoline.

As with the management of hazardous waste, there are two concerns that must be addressed when dealing with leaking storage tanks. First is the correction of past mistakes and mismanagement practices. I am submitting for the record with my testimony a list of 83 sites that we are currently working on in Florida where contamination has occurred as a result of gasoline leaks.

The second concern that must be addressed is a preventative program, one which provides better assurances that leaks will not occur, or at least be minimized and detected as soon as they do.

In this regard, the 1983 Florida legislature authorized the department of environmental regulation to establish a regulatory program governing underground and above-ground pollutant storage facilities. Pollutants are defined in the statute as "oil of any kind in any form, gasoline, pesticides, ammonia, chlorine, and derivatives thereof, excluding liquefied petroleum gases."

The statute allows the department to adopt tank construction standards, permit requirements, maintenance and installation standards, and removal or disposal standards. The facilities regulated by statute are those nonresidential, stationary tanks which contain pollutants, and which have a storage capacity greater than 550 gallons.

In developing our regulatory program, we've learned that our assignment may be overwhelming. We simply do not know how many facilities we may be regulating.

Similarly, the universe of materials that could be classified as pollutants under Florida law could be quite massive and perhaps unmanageable if all pollutants were regulated in the same manner.

We also are concerned that any regulatory program developed must be both reasonable and enforceable. To better meet these unknowns, we have decided to phase our program, beginning with the regulation of storage tanks holding petroleum products used as fuels for transportation. This will include above-ground bulk storage facilities such as airports and jobber bulk plants and underground tanks which might include retail and wholesale service stations, governmental agencies, and private fleet operations.

In the underground tank category, we estimate more than 40,000 tanks exist at wholesale and retail locations alone in Florida, and an unknown number are associated with municipal, county, State, and Federal governmental agencies as well as privately owned facilities, such as trucking companies, car rental agencies, taxicab companies, business fleets, and any private firm maintaining buried storage tanks.

We are planning to defer action on the regulation of other storage facilities such as powerplants, home heating fuel suppliers, pesticide storage facilities, pressure vessels for storage of chlorine and ammonia, petroleum exploration and production facilities, temporary facilities largely associated with building and road construction, and the small users.

I would like to briefly discuss how we intend to prevent future contamination problems from underground storage facilities with this first phase of our rule.

One of the most difficult issues we are facing is how to determine whether there has been a loss of pollutant from a leaking tank. The measured volume of gasoline in a tank is extremely sensitive to temperature changes. A 1-degree drop in temperature in a standard 10,000-gallon storage tank will result in an apparent loss of approximately 7 gallons of gasoline. At the service station level, temperatures are not considered in determining inventory losses. Our dilemma has been, what is a significant loss or gain, and what should be done if a significant loss or gain is detected?

A major oil company has advised us that over 40 percent of its gasoline storage tanks show a loss of over one-half of 1 percent on an annual basis. However, after investigating and rechecking records, the losses attributed to leaks or thefts are reduced to less than 1 percent.

Due to resource limitations, and the potential of being overwhelmed with paperwork, we have decided not to require notification to the department unless an unresolved 1 percent loss—or gain—is detected over a 5-day inventory period, or unless 50 gallons is lost, whichever is greater. If the cause of the loss or gain is not determined, tank testing may be required.

Monitoring wells or continuous pollutant detectors will be required at new facilities, and existing facilities will be required to modify their tanks by lining them and installing wells or detection devices no later than 1990.

We are proposing that newly installed underground tanks be either cathodically protected steel, glass reinforced plastic, steel clad with reinforced plastic, or double-walled steel or plastic. Our proposed rule does not allow the installation of bare steel or standard steel tanks. Monitoring wells are to be installed at each facility and checked every 2 weeks for oily sheen or odor, or be otherwise tested for traces of fuel.

We are requiring registration of all existing facilities, and notification of the department upon abandonment, sale, modification, when testing is done, and if discharges or leaks are discovered. We are concerned that abandoned tanks are commonly sold and reused without being restored to good condition. Our rules address this.

The proposed standard allows the department to require testing of a tank if it fails to comply with State rules, if the well indicates a discharge has occurred, or if ground water contamination exists and the facility is reasonably likely to be a source of the problem.

Florida law also requires each owner or operator of a facility to establish and maintain evidence of financial responsibility to cover any liabilities associated with spills or facility failures. We have deferred standards in this area.

In our rule, we have relied upon the recommendations of several standard-setting associations, such as the American Petroleum Institute, the American National Standards Institute, the National Fire Protection Association, and others. The expertise developed by these organizations was used to assist us in developing our standards.

The proper management and control of gasoline storage is fairly well understood. Regulations covering storage facilities for gasoline and similar transportation-related fuels can be developed without major research efforts. However, due to the large number of facilities falling into this category, caution needs to be taken to develop a manageable and enforceable program.

The regulation of facilities storing other kinds of hazardous materials will require much more research.

To conclude, I believe Florida is developing a strong and reasonable storage tank program at the State level. There is, of course, room for improvement. The identification of appropriate substances other than transportation fuels and the proper management standards for these substances are key factors to a successful program.

There is an immediate need for the EPA to provide training and technical assistance to both industry and State governments if these materials are to be properly managed. Also, proper enforcement is critical to the program's success. The legislation passed by the 1983 Florida Legislature showed an increased awareness of the leaking storage tank problems facing the State. These problems are not limited to Florida. It is a national issue that impacts every State. We encourage you to consider our experience as you prepare legislation. We will be pleased to work with you on this matter.

Thank you.

Senator DURENBERGER. Thank you very much.

Let me ask each of you, first, a general question. I have an attachment back here in my loose leaf that reviews all the States in the country and what they are doing. I cannot find many that are doing anything other than the folks before us. Why is that?

Mr. McVETY. We are finding in Florida that there is an increase in the number of leaks, perhaps all of the tanks that were installed back in the fifties and the sixties, about the time the interstate program was getting under way, are reaching the stage where it all seems to be happening at once.

Senator DURENBERGER. Don't you fellows go to meetings of water resource administrators and public health engineers and solid and hazardous waste folks around the country? Do you ever talk about this problem? Why aren't the rest of the States doing anything? Do you have any idea?

Mr. BURGESS. In all fairness, we do talk to each other, but I think this is a problem that most people in this country in the early seventies and before were willing to ignore when it comes right down to it, both the industry as well as the government.

There were problems that existed that nobody had a strict mandate to respond to. In a lot of cases the fire chiefs would respond to them. In some cases the State or county governments would respond to them.

However, with the magnitude of the problem that is developing now, and the fact that we do see more of these types of incidents, I think that most regulatory agencies have "woken up," if you will allow that term, to the problem and decided that it is time to address it. Many of us have tried for a number of years. As I said, we started back in 1978, but just did not have the data or the information to prove ourselves. We had to wait for a while, until we were in a position to do that.

I think that this is probably a situation that existed all across the country.

Senator DURENBERGER. Let me ask you a couple other questions that are related to going back and wondering what role there is for State and local governments in this process.

If I buy a piece of property anywhere in this country, there is a growing set of regulations that relate to the quality of what is above ground. You buy a house, and you have to show some kind of inspection certificate. In Virginia I have to have a termite inspection certificate. We don't have those in Minnesota, so we don't have to worry about that. However, there is nothing about what is below the surface, the sorts of things they cannot see. Oh, yes, I guess we do have some sort of inspection on a septic tank or something like that.

However, is there in place in any of your three States any kind of requirements on the transfer of property to, in effect, warranty the condition of underground storage tanks when title is transferred to a piece of property?

Yes, sir?

Mr. PIM. In our code we include a provision for transfer of tanks, saying that it is illegal for an owner to pass to another owner a piece of property containing an improperly abandoned tank without the knowledge of the new owner.

Senator DURENBERGER. OK. That is an abandoned tank now. However, when an active tank is part of a dry cleaning establishment or an automobile rental facility, or Lord knows what we have been talking about here today—when that is transferred, is there any requirement in New York law or in ordinances in Suffolk County that, in effect, produce some sort of a warranty against the condition of underground storage facilities?

Mr. PIM. We didn't include anything related to the transfer of an active tank. It is illegal to operate an improper active tank or to possess it or maintain it. So the old owner would have been engaging in an illegal act. If the new owner inadvertently bought it and discovered that it was an illegal situation, if it caused him then financial damage, he would have the right to go back after the old owner. But there isn't anything in the law directly related to the transfer.

Senator DURENBERGER. Can you think of any good reason why it is not in the law? You are not hearing this for the first time, are you, the suggestion?

Mr. BURGESS. In Maryland we don't have the authority under our statute to write regulations that affect the private homeowner. Although we can make them clean up their spill if they have one, under our regulations we cannot regulate their tank in the ground. This is where we really are going to embark on an education program for the installation companies, the tank manufacturers, and people like this, to try to get a handle on that problem initially. If we don't succeed in that area, we may seek other means to do it.

Senator DURENBERGER. Let me ask you a question that relates to the comments I think you made, Mr. Burgess, on the cost of doing some of these things that we might recommend in this amendment.

To what degree currently are license fees or other kinds of user fees employed at the State or local levels to finance inspection and

enforcement activities under some of the kinds of regulatory activities which you have testified to here today?

Mr. BURGESS. In Maryland we have a little different situation than we do in most other States, in that we have what we call terminal license fee that was set up by the State legislature. Any facility that stores over 3,000 barrels or 126,000 gallons of oil has to pay our terminal facility license fees. They obtain a license for that. That money goes into the State contingency fund. The contingency fund finances all oil-spill-related activities in the State of Maryland, including personnel, materials, and equipment.

We have quite a bit of equipment expenditures in that we have open water response equipment for barge groundings and tankship accidents right down to sophisticated electronic tapes for underground leaks. That is where the money comes from to be used in oil spill control.

We do use a small portion of general funds in that our enforcement division is funded through general funds, and their enforcement activities as they relate to oil spills do come from that source.

Senator DURENBERGER. Any other observation that anybody has?

Mr. PIM. Yes. New York State has a very efficiently run oil spill contingency fund taxing oil moving into the State. It is set at a \$25 million limit. That works very, very well and takes care, at least in our area, of all of our oil spill problems.

Senator DURENBERGER. That is oil coming into the State?

Mr. PIM. It is taxed on the oil coming into the State through major facilities, over 400,000 gallons.

Senator DURENBERGER. But the owner or operator of a storage facility does not pay any fees?

Mr. PIM. He pays the fee, but on the oil that passes into the facility.

On our local level, we have a \$25 fee per tank for registration. I said we had 6,700 tanks that we had registered. We also have a \$100 fee for plan review. We review all plans that come in for new construction. Therefore, \$100 per tank comes in that way.

Then we have our penalties for violations of the law, and we have collected substantial sums that way.

Senator DURENBERGER. In Florida?

Mr. McVETY. In Florida we do not have a registration fee for the facilities we regulate. However, we have an equivalent to your Superfund at the State level. When it drops below a certain level, which is \$3 million, it kicks into action a 2-cents-a-barrel tax at the facility where the pollutant first rests in Florida.

Senator DURENBERGER. One last question related to the testimony we heard earlier on inventory control practices: We were told that that is probably the most effective kind of a device for policing the performance of underground storage tanks.

From your experience, is this practice an effective means for protecting against leaks?

Mr. PIM. We consider it useful but not overly effective, because to be effective it requires very close, constant monitoring. Someone has to be continually going around to all of the stations insisting that they keep records and maintain them.

Second, someone has to look at those records over an extended period of time for the record to have any meaning, because over a

short period of time we will not see the loss unless it is a massive loss. Somebody has to look over quite a period of time very carefully to look for a trend. It only works if the records are good.

We think it is a necessary, useful part of the system, but by no means adequate in itself at all. We want a system that is built in, that does not require action on people's part to work.

Mr. McVETY. Florida is going to rely on inventory, monitoring well system around the tanks, as well as protected tanks rather than bare steel tanks.

We are not going to rely on testing unless we suspect a problem, which is different than the other two.

Mr. BURGESS. We basically believe in inventory control, the fact that it will find a sudden loss; it will find a fairly rapid slow leak. But over a long period of time on a very slow leak, we have some serious questions about it.

We have been able to document facilities that have kept good inventory records—I'll put "good inventory records" in quotes—that have lost over 14,000 gallons of product without knowing it. So we do have problems.

Part of our documentation originated when we were wrestling with the industry over the issue of mandatory tank testing. We documented 12 incidents in about a year of facilities that kept inventory controls and had substantial spills. We think it is essential. If done properly, it usually will show up leaks, but we want a reinforcement to the inventory system.

Senator DURENBERGER. Gentlemen, thank you very much for your testimony. We appreciate your being here.

The hearing is adjourned.

[Whereupon, at 3:39 p.m., the committee recessed, to reconvene at the call of the Chair.]

[Statements submitted for the record follow:]

Statement of Frederick B. Killmar
President, Killmar Associates, Inc.
before the
Committee on Environment and Public Works
U. S. Senate

March 1, 1984

INTRODUCTION

Mr. Chairman, and members of the Committee, it is a pleasure to be here today to discuss the underground storage of petroleum products and leaks from underground tanks and piping systems.

I am Frederick B. Killmar, President of Killmar Associates. My company specializes in the storage and handling of petroleum products and works for a variety of clients, including petroleum equipment manufacturers, oil companies, engineering firms, associations, and attorneys or law firms which represent petroleum marketers. Today I am speaking for myself as a geologist and individual who has been keenly interested in petroleum storage for nearly a decade. I am a former employee of the American Petroleum Institute (API) where I served for six years as the coordinator of the Institute's underground leakage program. I also served as the coordinator of API's safety and fire protection activities.

I have been requested by staff to provide this Committee with background information on underground leaks. I plan to limit my testimony to that subject and not address the specifics of various legislative proposals.

TANK POPULATION AND OWNERSHIP

The problem which will be discussed today is quite complex, a point which should become apparent as I attempt

to explain two important points: the number of tanks buried in the United States and who owns and operates those storage systems.

No person, company, association, or government agency knows how many tanks are in use throughout the country. Estimates range from a low of 1.2 million to over three million tanks. And, these figures exclude the million or more underground tanks that store heating oil at residences. Recent government statistics show that there were 136,570 "service stations" at the end of 1983. This number only includes those facilities which receive over 50% of their income from the sale of gasoline and oil products. Therefore, excluded are thousands of locations such as convenience stores, mass merchandisers, general stores and the like where products are sold from underground tanks.

Last fall, the Lundberg Letter estimated that there are 210,000 units where any motorist could drive in and buy gasoline. If each of these facilities had an average of three underground storage tanks, then marketing facilities would account for 630,000 of the nation's underground tanks.

Some individuals who try to calculate the underground tank population believe that for every tank that is buried at a location which markets gasoline, there is at least one tank that stores petroleum products at another type of facility. Every major corporation probably owns tanks. They are used to store products for company vehicles or for products which are used in manufacturing a company's line of goods.

Many thousands of tanks are located on farms. Municipal facilities store fuels for fire fighting equipment, police vehicles, and maintenance trucks. States own tanks for their automobiles, snowplows, and mowing equipment. Tanks are installed at car rental agencies, auto dealerships, bakeries, dairies, airports, and military bases. Included in the list are dry cleaners, marinas, the U. S. Postal Service, mass transit authorities, national parks, and office buildings. Virtually all hospitals have tanks to store fuel for emergency power generation and heat.

While attending a meeting just a few weeks ago in Dade County, Florida, where new underground leak prevention and detection regulations were recently enacted, I sat next to a gentleman from the Dade County Board of Education. His interest in the meeting was based on the fact that there are approximately 250 tanks owned by the County's school system, all of which will now be required to be monitored.

Nobody knows the size of the tank universe, but everyone should recognize that it is quite large and diverse.

Adding to this subject's complexity are the many different types of companies and individuals who have the responsibility for the day-to-day operation of a facility and that responsibility includes the maintenance of inventory control records and the detection and reporting of leaks should they develop. Major oil companies own an estimated 25% to 35% of the tanks in the U. S. At only a small

percentage of these locations is the ownership and operation of the facility "straight forward" where the company owns the land, the station building, the tanks, and employs the individual responsible for the day-to-day operation of the facility. At most facilities owned by major oil companies, the day-to-day operation responsibility rests with a leasee dealer.

A group which owns a large percentage of tanks is comprised of wholesalers who own their own marketing facilities, including the tanks, and either "fly the flag of a major" or use their own private brand name. Some of these facilities are operated by salaried employees, while others are operated by leasees. Wholesalers also own tanks at consumer accounts, such as local taxi companies. The wholesaler installed the tank at his expense on another company's property as part of a business arrangement whereby the wholesaler supplies the product to the consumer.

The ownership and operation of some facilities can be extremely complicated. One individual may own the land which is leased on a long-term basis to a second individual who builds a gasoline marketing facility on the property. The tanks at the location may be owned by a third party, the wholesaler, who supplies products to the location and a fourth party may lease or sublease the facility to operate the location on a day-to-day basis. It should be easy to understand why an individual or community that has been affected by an underground leak can become very frustrated in determining what individual or company is actually responsible to take action to mitigate the problem.

CAUSES AND EFFECTS OF LEAKS

Leaks from underground tanks and piping systems have occurred for years. Although most people may not believe me, I am confident that only 10% of the tanks and pipes which have failed in the past, actually created problems. In many cases, the failure was quickly detected by water entering a tank, by a piping leak detector, or by a discrepancy in inventory records. The pipe or tank was repaired or replaced and the community was not adversely affected. But, when a leak is not quickly detected, the unconfined petroleum products may present several potential hazards:

- o Fire or explosion,
- o Damage or destruction of sewers and sewage treatment plants,
- o The loss of telecommunications services and electrical power as a result of the deterioration of underground cables, and
- o The disruption of businesses and families when flammable vapors enter buildings.

Only during the past several years has the problem of groundwater contamination from underground leaks been recognized as being a problem of significant magnitude to deserve such notoriety.

You may ask, if leaks have occurred over the years, why does there appear today to be an increase in their occurrence? That can best be explained by noting changes that took place during the 1950's and 1960's. During that

period, hundreds of thousands of unprotected underground steel tanks were installed. Demand for petroleum products was growing, so new outlets were constructed. Also, the increase in demand made it advantageous for existing outlets to increase their storage capacity by adding a tank or two, or by removing all of the small, existing non-leaking tanks and installing those that had higher capacities. The net effect was the creation of a population of tanks of the same vintage. Many of these tanks have since been replaced, but too many are still in service and have corroded to the point where they are leaking or should be expected to become leakers in the near future.

There are many ways in which product can leak from a storage and piping system: deteriorated "O" rings in pumps, loose plugs in tanks, improperly cemented pipe unions, ruptured hoses, pressure couplings that have worked loose, physical breakage of tanks or pipes, or the failure of flex connectors as a result of stress. But these causes combined are minor when compared to the major leak source -- corrosion.

Statistics I gathered while employed by API verify that statement. It was learned from 1,717 tank and piping leak survey questionnaires that, of the 540 piping leaks which were reported, 66.6% were caused by corrosion. It was shown that 90.7% of the steel tank leaks were the result of corrosion. When breaking down all leaks by categories of equipment type, unprotected steel tanks and unprotected steel pipes accounted for 92.8% of all reported leaks.

A move away from the use of unprotected steel systems is apparent as petroleum marketers and other tank owners have recognized, or are beginning to recognize, the need to use systems which are protected from corrosion at new and replacement locations. "Common business sense" suggests the use of such systems. Furthermore, fire codes in many parts of the country have been changed to require their use.

FIRE CODES

As noted earlier, the hazards which may develop when leaks occur are not limited to groundwater contamination. Over the years, requirements pertaining to underground tanks and piping systems have been addressed through fire codes, in an attempt to reduce the incidence of leaks and their potential to create unsafe conditions.

Fire codes are the responsibility of state and local government. Recognizing that it is almost impossible for a small jurisdiction to develop a fire code, code officials in this country have joined together in professional societies called model code organizations. There are four such organizations in the U. S. and each writes model codes: the Building Officials and Code Administrators International, Inc. (BOCA), the International Conference of Building Officials (ICBO), the International Association of Plumbing and Mechanical Officials (IAPMO), and the Southern Building Code Congress (SBCC).

Also, the National Fire Protection Association (NFPA) is often referenced or paraphrased in the model

codes or in local and state codes. NFPA-30, "Flammable and Combustible Liquids Code," is considered by most to be the authoritative code.

Model codes are very dynamic. Proposed changes may be submitted to reflect new technologies that have been developed or to reflect problems that have occurred with materials or operating procedures. Appropriate revisions are made when approved by committees and the general membership.

The first model code to recognize the corrosion leak problem was the Uniform Fire Code which is used extensively in western states. The section of the code pertaining to equipment selection based on corrosion protection was modified in the mid-1970's. The current section of the code is appended as Attachment I.

NFPA-30 addresses corrosion protection as is noted in Attachment II. Moreover, NFPA's corrosion protection requirements are expected to be further strengthened as noted in Attachment III.

The American Petroleum Institute supports the use of such equipment in its publication on underground petroleum storage systems (Attachment IV).

If the states and communities throughout this country were to adopt and enforce the current editions of these codes, most likely there would be no reason why this Committee should find it necessary to conduct this hearing. These codes, particularly NFPA-30, contain

sensible requirements for the proper types of tanks and piping, leak detectors on pressure piping systems, accurate daily inventory control, as well as strict installation procedures.

SEVEN RECOMMENDATIONS

During my years with API, one of my responsibilities was to conduct seminars throughout the country on leak prevention, detection, and clean-up. I would always recommend seven points to tank owners, fire protection officials, and environmental personnel. I have not changed my recommendations even though I left API nearly three years ago to start my own business. These recommendations are:

1. Maintain accurate daily inventory control at all marketing facilities. Inventory will not detect all small losses. But there is no excuse for an undetected loss of thousands of gallons if proper inventory control practices are employed.

2. When installing new or replacement tanks and piping in corrosive areas, use only those systems which are protected from corrosion. These would include fiberglass; steel protected by sacrificial anodes; fiberglass-coated steel; or impressed current cathodically protected steel. Unprotected steel systems should be used only at those locations where a corrosion test shows that corrosive conditions are virtually innocuous.

3. If one tank fails due to corrosion, the other tanks at the same location which are the same age or older should be replaced or upgraded.

4. Follow strict tank and piping installation procedures when new equipment is placed underground.

5. Equip all pressure piping systems with leak detectors that are maintained and tested to the manufacturer's specifications.

6. When a leak is suspected, test tanks and piping in an acceptable and accurate manner. Don't air pressure test installed underground tanks.

7. If there is a significant product loss, don't just stop the leak -- notify the appropriate authorities and recover the bulk of the lost product before it creates problems.

CONCLUSION

Three concluding points are worthy of mention. First, not only is this problem quite complex, but the awareness level of tank owners varies significantly. No doubt most of you recognize that several major companies have initiated leak prevention and detection programs costing hundreds of millions of dollars. You should also recognize, however, that a large number of smaller firms which own only a few tanks would be amazed to sit in this hearing and learn that the Federal Government is deeply concerned about the condition of the tanks located at their facilities.

Second, many states and municipalities already have taken steps to address underground leaks. Some of these locations have exceedingly important groundwater supplies which are highly susceptible to contamination from leaks. Suffolk County, New York, and Dade County, Florida, serve

as examples of such areas. Although I may not necessarily agree with the specifics of their regulations, I can appreciate why they found it necessary to take actions to prevent future problems. It should be noted that all areas of the country are not as sensitive to underground leaks as these two communities and do not warrant such stringent regulations. No doubt there are other areas where regulations are appropriate, but is it actually necessary for the Federal Government to become involved with a subject which probably can be better handled on a more site-specific basis by states and counties?

Finally, if the Federal Government does becomes involved with the underground storage of products, recognize that there is no need to "reinvent the wheel." Agencies do not need to spend tax dollars in an attempt to design new types of storage systems or find new ways of installing them. Recently updated Codes, Standards, and Industry Recommended Practices address the solutions to leaks. These need to be adopted and enforced at the state and local level.

Thank you for the opportunity to testify. I would be most happy to answer any questions.

1982
UNIFORM FIRE CODE

ARTICLE 79
FLAMMABLE AND COMBUSTIBLE LIQUIDS
SECTION 79.603
CORROSION PROTECTION

Corrosion Protection

Section 79.603. All underground tanks and piping shall be protected from corrosive conditions by any of the following methods:

- (a) Through the use of an engineered, properly installed and maintained cathodic protection system.
- (b) Approved corrosion-resistant materials of construction such as special alloys, nonmetallics, reinforced plastic coatings, composites or equivalent systems.

If conditions, based on adequate proof, actually warrant the deletion of the corrosion protection requirements, the chief may waive the corrosion protection requirements.

NATIONAL FIRE PROTECTION ASSOCIATION
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
NFPA 30
1981

2-3.3 CORROSION PROTECTION.

Unless tests show that soil resistivity is 10,000 ohm-centimeters or more, and there are no other corrosive conditions, tanks and their piping shall be protected by either:

(a) a properly installed and maintained cathodic protection system with or without coatings, or

(b) corrosion resistant materials of construction such as special alloys, fiber glass reinforced plastic, or fiber glass reinforced plastic coatings, or equivalent approved system. Selection of the type of protection to be employed shall be based upon the corrosion history of the area and the judgment of a qualified engineer.

(See API Publication 1615-1979, "Installation of Underground Petroleum Storage Systems", for further information.*)

*Available from American Petroleum Institute, 1220 L St., N.W., Washington, D. C. 20005.

PROPOSED CHANGE TO
NFPA 30

(EXPECTED TO BE APPROVED IN 1984)

2-3.3 Corrosion Protection. Tanks and their piping shall be protected by either:

a) A properly engineered, installed, and maintained cathodic protection system consisting of:

- 1) tanks with or without coatings, equipped with an impressed current system or,
- 2) tanks coated with a durable dielectric coating and equipped with zinc or magnesium anodes.

b) Corrosion resistant materials of construction such as special alloys, fiber glass reinforced plastic, or fiber glass reinforced plastic coatings, or equivalent approved system. Selection of the type of protection to be employed shall be based upon the corrosion history of the area and the judgement of a qualified engineer.

(See API Publication 1615-1979, "Installation of Underground Petroleum Storage Systems" for further information.*)

The authority having jurisdiction may waive the requirements for corrosion protection where evidence is provided that such protection is not necessary.

*Available from American Petroleum Institute, 1220 L St., N.W., Washington, D. C. 20005.

API PUBLICATION 1615
INSTALLATION OF UNDERGROUND
PETROLEUM STORAGE SYSTEMS

Two important points should be kept in mind by persons planning on installing new tanks and piping systems, or replacing existing systems that are leaking due to corrosion:

First, unprotected steel tanks should be used only in non-corrosive areas. Otherwise, install either:

- o A system constructed of non-corrosive materials such as fiberglass-reinforced plastic (FRP) or its equivalent; or

- o A steel system cathodically protected by an impressed current cathodic protection system, sacrificial anodes, or some other type of equivalent protection.

Second, if it is necessary to replace or interior-coat an underground steel tank which developed a corrosion-induced leak, it is recommended that all other steel tanks at the facility--which are of the same age or older--also be treated similarly, even though they may not be leaking at the time.



GROUNDWATER TECHNOLOGY

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HYDROCARBON CONTAMINATION

OF GROUNDWATER:

ASSESSMENT AND ABATEMENT

Testimony Presented by

Paul M. Yaniga

on

1 March 1984

to

Hearings of the

United States Senate Committee

on

Environmental and Public Works

The Honorable Robert T. Stafford, Chairman

The Honorable David Durenberger, Chairman

Subcommittee on Toxic Substances and Environmental Oversight

HYDROCARBON CONTAMINATION OF GROUNDWATER:
ASSESSMENT AND ABATEMENT

INTRODUCTION

The degradation of groundwater by hydrocarbons and other pollutants is a paramount problem of international dimensions. Literally hundreds of thousands to millions of gallons of potential groundwater contaminants (mostly organic compounds) are reported to be lost annually from underground storage tanks and pipelines.

Recent years have seen the problem and its address by industry and government intensify. The body of governmental regulations and industrial guidelines concerning the use by industry and the public of underground storage tanks for fuels and chemicals has also increased. Along with this increasing "user awareness", there has also been a growing public awareness of the effects of accidental spillage. The increasing dependence of municipalities, industrial concerns, and private households on groundwater supplies provides a stark counterpoint to the increasing frequency with which these supplies are impacted and rendered aesthetically objectionable or essentially unusable by hydrocarbon contamination.

The degradation and contamination of groundwater supplies have also become a commonly reported media topic for the 1980's. The reporting of groundwater contamination problems usually receives front-page, yet short-lived, attention. Conversely, the subsequent programs undertaken by industry for the assessment and abatement of these problems receive little media attention. The reasons for this lack of follow-up coverage are numerous, but surely include the public's general lack of information and their misconceptions concerning subsurface conditions.

A typical exposure of the public to the groundwater environment is based on the limestone caverns visited on a vacation or outing. This type of exposure develops a sense of awareness of

these groundwater systems that normally comes complete with visions of underground rivers, open chambers, and attendant travertine deposits christened like so many mythical objects. These experiences tend to cloud and influence perspective to the point that when an individual is confronted by a potential groundwater problem, the response and actions taken to "assess and abate" the condition are quite restricted or limited in comprehensiveness.

In reality, the typical groundwater environment is characterized by a network of very small, interconnected pore spaces in unconsolidated silts, sands, and gravels and very small, interconnected joint sets and rock fractures in sedimentary, metamorphic, and igneous rock. Through these tiny interconnected openings, groundwater and contaminants are transmitted very slowly. A response to hydrocarbon contamination conditioned on the "underground rivers" scenario thus can often be more simplistic than is warranted by the situation.

Impacts of Hydrocarbon Leakage

The loss and spillage of refined petroleum products, in some cases, have resulted in complex groundwater problems of major significance. The impacts of fugitive volatile organics in the subsurface environment vary widely. Common problems include, but are not limited to:

- Contamination of potable water supplies.
- Long term health concerns associated with the inhalation of hydrocarbon vapors.
- Immediately serious concerns of flammable concentrations of vapors in homes, utility conduits, and other structures.

The sources of these losses also are quite varied, ranging from small losses at a homeowner's fuel storage tank to leaks of

major magnitude at commercial refining, storage, transfer, and retailing facilities. Although recent years have seen marked increases by industry in the safe handling, control, and transfer of refined organic products, inadvertent, accidental, and certainly unintentional losses of organics still occur.

When these problems occur, it is common for the smaller volume, less cataclysmic losses at small volume retail facilities to have the greater socio/environmental impact. This is true because the small volume users and retail outlets are often located in close proximity, if not immediately adjacent to, commercial and residential establishments. Such facilities may rely on individual groundwater supplies that are subject to degradation by the lost hydrocarbon products, or they may be serviced by common utilities, whose backfilled pathways act as conduits for the transmission of fugitive products and associated vapors. The factors of physical proximity and reliance on groundwater, when coupled with the introduction of refined organic products to the subsurface, can generate problems of local significance and sensitivity.

In approaching the definition and abatement of such problems, clean-up programs must entail mechanisms for the thorough definition of the problem, the treatment of its symptoms, and a comprehensive program for the removal or abatement of the organic product in the subsurface environment. These approaches must be technically sound and acceptable to governing regulatory agencies, physically and economically viable to enact, and acceptable to the impacted parties.

The overview that follows describes the types of investigative and clean-up programs that are successful in resolving the contamination problems resulting from hydrocarbon losses from underground tanks and piping. The methods of investigation and treatment are described within the framework of a few of the projects either ongoing or completed by Groundwater Technology. The overview starts with a discussion of the characteristics of

subsurface contamination by fugitive hydrocarbon products. This background discussion is followed by a description of the investigative approach and abatement alternatives used by Groundwater Technology to address the problems associated with hydrocarbon contamination of the subsurface.

OVERVIEW OF CONTAMINATION CHARACTERISTICS

The symptomatic contamination problems commonly associated with hydrocarbon loss include:

- ° Odors and vapors in buildings, subways, elevator shafts, and utility vaults.
- ° Taste, odor, and discoloration of groundwater from wells and springs.
- ° Accumulation of vapors and hydrocarbons from seepage and infiltration into sanitary and storm sewers.
- ° Disruption of communication service from seepage of organic chemicals into underground communication lines.
- ° Seepage of organic chemicals to surface waters.

During any leak or loss of hydrocarbons or other contaminants, the dominating, controlling force is gravity, which causes the fugitive contaminant to move downward until it meets some restrictive horizon (Figure 1). In many cases, gravity induces the contaminant to move downward from the surface until it reaches (and thus contaminates) the groundwater system.

Important factors in the movement and rate of travel are:

- ° The volume of loss.
- ° The permeability of the materials through which the contaminants pass.

Statistics are provided below to illustrate the magnitudes of some typical free product recovery programs either managed or serviced by Groundwater Technology. One of the notable points in these statistics are the geographic spread of the problem of free-floating organics. It should also be noted that most of these problems occurred before the current status of heightened awareness.

AVERAGE VOLUME RECOVERED

<u>Location</u>	<u>Type of Facility</u>	<u>Ongoing Recoveries</u>	<u>Product Type</u>
West Coast, USA	Abandoned Bulk Storage	500-1000 gal/wk.	Mixed Fuels
South Korea	Fuel Loading Rack	1000-1500 gal/wk.	Jet Fuel/Avgas
East Coast, USA	Below Ground Tank/ Loading Rack	1000-1500 gal/wk.	Jet Fuel
North Coast, Venezuela	Pipeline/Bulk Storage	28,000 gal/day	Gasoline
Eastern USA	Bulk Storage	500-700 gal/day	Fuel Oil
Southwest USA	Refinery/Bulk Storage	3000-5000 gal/day	Mixed Fuels
New Zealand	Refinery/Bulk Storage	1500-2000 gal/day	Gasoline/ Gas oil
Midwestern USA	Retail Fuel Facility	700 gal/month	Gasoline

In areas characterized by silts and clays, which have a low permeability, the movement of the contaminant is often restricted to zones of increased permeability, such as those created by excavation and backfill. This phenomenon often accounts for the fact that when dealing with losses from underground storage facilities, the highest concentrations of spilled hydrocarbons occur in tank pits and service line trenches. The surrounding silt and clay materials (i.e., materials of low permeability) normally have a greater affinity for the adsorption of fugitive hydrocarbons and for restricting the passage of hydrocarbons to the water table and hence, through the aquifer.

In areas of high permeability, some product also is adsorbed on soil and earth materials. Most of the product will, under these more permeable conditions, infiltrate through soil and rock materials until it intercepts the water table. The quantity of product that reaches the water table is, as previously noted, dependent both on the quantity of loss and on the portion of silt and clay in the soil profile (i.e., the greater the loss and the coarser the earth materials, the larger the amount of free product that will reach the groundwater). As illustrated in Figure 1, fugitive hydrocarbon products generally manifest in the subsurface in the following ways:

- ° As adsorbed hydrocarbons in the unsaturated zone above the water table.
- ° As free product in the saturated zone atop the water table.
- ° As dissolved or emulsified product in the aquifer.

With the passage of time, the immiscible hydrocarbon product on top of the water table and the dissolved hydrocarbons within the aquifer will move laterally, in the direction of the groundwater flow or gradient. Interception of the water table by natural or manmade discharge points (springs, wells, etc.) will bring the hydrocarbon-contaminated water, or symptoms thereof, to the surface, where it may exhibit objectionable taste and odor. In certain aquifers, the natural decomposition of hydrocarbons will lead to the development of reducing type conditions. Under these conditions, associated geochemical changes will occur, such as the excessive leaching of iron and manganese from the formation and their subsequent precipitation after reintroduction to oxygenating environments. Interception of the water table by subsurface features, such as building foundations, pipelines, subways, tunnels, and sewers, often allows the free-floating product or vapors to collect in potentially explosive amounts in the subsurface.

PROBLEM ASSESSMENT/RESOLUTION

The successful abatement of any groundwater problem is always a function of how comprehensively it has been assessed and, correspondingly, how well it is understood. There exists no stock method for the recovery of free-floating hydrocarbons or for the abatement of dissolved and emulsified hydrocarbons in groundwater. The resolution of each recovery/abatement problem depends primarily on its unique aspects:

- ° The amount and type of contaminant involved.
- ° The hydrogeology of the affected area.
- ° The proximity or absence of sensitive resources that could be damaged by contamination (such as domestic wells and protected surface waters).
- ° The potential for ignitions, explosions, or asphyxiating concentrations of hydrocarbon vapors.
- ° The potential for public health impact via inhalation of organic vapors.
- ° The background water quality.

The major task in each recovery/abatement problem thus remains constant: the nature and magnitude of the contamination must be assessed so that an appropriate site-specific evaluation can be developed. Such a program must include a review of background logistical data on the contaminant loss, an examination of impacted cultural features, the consideration of potential impacts on other cultural features, and in-depth evaluations of soils, hydrologic, geologic, and hydrogeologic conditions that affect the loss of the contaminant, its movement through the subsurface, and the abatement of any associated groundwater problems. A typical program of evaluation should include the following:

- * Collect background data and information on the history of the problem.
- ° Field survey the area to assess surficial geology.
- ° Review available geologic documentation, drill logs, and test boring information to assess subsurface geology.
- ° Assemble available groundwater data to evaluate hydrogeologic conditions.
- ° Conduct on-site surveys of existing wells, springs, and streams to enhance the definition of the groundwater regime.
- ° Conduct additional on-site surveys to map the concentrations of hydrocarbon vapors, especially in basements, sumps, conduits, and other structures.
- ° Select the locations and specify the designs of observation wells. Supervise the construction of observation wells, maintaining detailed geologic logs of earth materials, water-bearing horizons, and any unusual conditions (i.e., free-floating hydrocarbons or odors). Collect samples of geologic materials for the quantitative analysis of adsorbed hydrocarbons.
- ° Prepare a topographic map of the site that shows the locations of all observation points. Survey the tops of observation well casings to provide elevation control.
- ° Perform detailed measurements of the water level and the thickness of free-floating hydrocarbons in each well (minimum two occasions).
- ° Collect water samples to document the concentrations of hydrocarbon species dissolved in groundwater. Conduct bioculture studies to determine the feasibility for subsurface decontamination by biodegradation, if necessary.

- ° Prepare contour maps showing water table gradient, the thickness of free-floating hydrocarbons, and the concentrations of dissolved organics in the groundwater. These maps are used both to document the extent and magnitude of the problem and to determine the directions in which the groundwater and hydrocarbons are moving.
- ° Assess the data collected from the above items to determine the most effective and feasible methods for abating the vapors and the dissolved and free-floating hydrocarbons.
- ° Conduct a short term pump test (or slug test or bailing test) at selected test well locations to determine aquifer characteristics (i.e., transmissibility and coefficient of storage).
- ° Maintain detailed water level/drawdown data on the pumping wells and observation wells to enable the preparation of a distance-drawdown curve. These data aid in determining the area that can be effectively controlled by the pumping well (i.e., the area that lies within the cone of depression).
- ° Evaluate the accumulated data to determine the need (if any) for additional assessment work and to design one or more systems for abating the problem, as needed. The abatement program can include one or more of the following:
 - Recovery of free-floating hydrocarbons via a two pump system.
 - Treatment of dissolved organics by air stripping, carbon adsorption, and biodegradation.
 - Abatement of vapors by the use of positive or negative pressurization systems.

RECOVERY AND ABATEMENT ALTERNATIVES

Once the source of fugitive subsurface hydrocarbon contaminants has been pinpointed, the flow should be stopped, if possible. This means that the leaks should be plugged so that no additional product enters the subsurface. This is not critical to initiating a clean-up and recovery operation, but it does help to reduce the long-term cost of the program.

Address and Abatement of the Symptoms

The first symptoms of a hydrocarbon loss often are manifested in the form of vapors, which result from the volatilization of a portion of the fugitive organic product. These vapor symptoms often are more noticeable during periods of the year when soil conditions are wet from prolonged rains and when frost is in the ground. These conditions form an impermeable cap that causes the vapors to seek other avenues for venting to the surface, such as utility conduits or building basements. Because these vapors often have the potential to reach combustible levels, their presence usually elicits public demand for immediate attention. While it should be noted that the best long term method for vapor abatement is to recover or neutralize the fugitive contaminants, it sometimes is necessary to abate the symptoms quickly so that imminent danger to the public is minimized. There are three general methods to address symptomatic vapor problems.

The first, most common method is to ventilate the affected structure(s) so that the atmosphere is exchanged or cleansed, either continuously or on command. This method is effective, but it can raise the cost of heating or cooling the structure beyond the point of economic feasibility. This approach also has the tendency to induce vapor movement into the structure by creating a negative pressure to which vapors will migrate.

The second approach that has been used successfully by Groundwater Technology involves the induction of a positive pressure within the structure that inhibits the inflow and accumulation of vapors. This is accomplished by adding a volume of make-up air to the structure that is greater than its collective air loss. This make-up air is seasonally heated and cooled as necessary.

The third approach, also successfully applied by Groundwater Technology, involves the forced ventilation of vapors from soils before the vapors can accumulate within the structure. This is accomplished by installing horizontal or vertical collection pipes below grade and connecting them to a high vacuum pump that pulls the vapors to a central area for safe venting and/or destruction.

The preferred approach for comprehensive address to vapor mitigation in buildings employs a combination of the latter two systems (Figure 2).

Problem: Vapors Emanating From a Free-Floating Hydrocarbon Plume

A subsurface spill resulted in the accumulation of an organic compound (unleaded gasoline) on the water table beneath a residential neighborhood. The organic compound started to volatilize, allowing vapors to migrate and accumulate in basements following heavy fall rains and the development of a frost cap. The vapors thus presented both a nuisance problem (from an explosive concentrations viewpoint) and a potential health concern with respect to the inhalation of hydrocarbon vapors. Seven homes were adversely affected.

By conducting a detailed hydrogeologic investigation, both the areal extent and the mechanism of hydrocarbon movement were determined. The odors and vapors are currently being controlled and abated by a combination of soil venting and positive pressurization of the affected homes. These systems involve both an external preheating system (or cooling system, based on the season) for positive pressure air make-up and steeply inclined soil vents connected to a vacuum system. Concentrations of vapors have been reduced by greater than 99% within the affected building (Figure 2).

Free Product Recovery

The most effective method for abating hydrocarbon pollution by free-floating organics on the water table is with a recovery well and a two pump system (Figure 3). One pump depresses the water table in the aquifer by withdrawing groundwater at a controlled rate. The free-floating hydrocarbons move atop the water table toward the center of the "cone of depression" created by the water table depression pump.

As the immiscible hydrocarbons accumulate in the recovery well, they are pumped to the surface by a special "scavenger" pump, which is designed especially to pump hydrocarbon products. The pump may use either a patented cartridge or special hydrocarbon/water sensitive controls to ensure that it pumps only product. Likewise, the water pump uses special controls to ensure that it pumps only water to the surface.

This two pump Scavenger® methodology has been successfully applied by Groundwater Technology to numerous free product recovery problems worldwide. A typical example of its successful application is described below.

Problem: Free Product Recovery

Gasoline leaked into a shallow groundwater system from an underground tank in the Midwest and caused severe odor problems and an explosive hazard in an adjoining bank building. By applying a sound technical program that included 12 monitoring wells, Groundwater Technology conducted a survey to determine the extent of the spill and the pattern of groundwater contamination. As a result of the survey, a two-pump and Scavenger® system was installed. The properly designed "cone of depression" reached the farthest edge of free-floating gasoline and carried it to the recovery well. In two months odors were gone from the bank, and after one year of operation over 7,000 gallons of gasoline were recovered. Cost savings of over ten thousand dollars a day for keeping bank operations open were realized.

Impact and Abatement of Dissolved Hydrocarbons

The change from leaded to unleaded gasoline has magnified the problem of groundwater pollution. Octane boosting components, aromatic compounds like benzene, toluene, xylenes, and ethylbenzene, are slightly soluble in groundwater. Dissolved in groundwater, these chemicals usually affect a far wider area than the floating gasoline, and impart a bad odor and taste to groundwater used for drinking.

A more sophisticated work program is required for the treatment of hydrocarbons dissolved in the groundwater and adsorbed into the formation than is required for problems that involve only the recovery of free-floating product. In order to restore aquifers to usable conditions or to meet the chemical quality discharge limitations set by regulatory agencies, aeration or filtration are often effective as the principle means of product removal.

Air stripping units and activated charcoal filters are normally designed and constructed for such specific applications. The design and installation of these systems can be expensive, but in many cases aeration or filtration are the most cost-effective method to volatilize or capture dissolved product. The commonly employed air stripping process involves the controlled-rate circulation of water contaminated with volatile organic compounds. The contaminated water is fed to the top of a tower packed with a porous packing medium and air is fed from the bottom of the tower by a blower fan in a direction counter to the water movement. The downward moving water is forced to travel in thin layers over the packing medium through which the air is being forced in the opposite direction. The counter-current air flow volatilizes the organic compounds, removing them from the water.

The carbon adsorption process relies on the affinity of activated charcoal to adsorb certain organic chemicals. In practice, a cylinder packed with carbon is placed in line between the contaminated water source and the discharge point. The water with its attendant organic load flows through the carbon, where organic chemicals are adsorbed (physically) to the activated carbon. The capacity of the carbon for adsorption is finite and dependent on the quantity and type of organic chemicals in the influent. Influent and effluent qualities is frequently required to define carbon bed life and recharge frequency.

A more avant-garde method to renovate aquifers contaminated by dissolved hydrocarbons relies on the affinity of certain naturally occurring bacteria for hydrocarbons. The bacteria have been tentatively identified as belonging to the genera Arthobacter and Pseudomonas. In utilizing these bacteria to accelerate the renovation of dissolved hydrocarbons in groundwater and to hasten the reduction of adsorbed hydrocarbons from soil and rock materials, the addition of controlled quantities and rates of oxygen and nutrients is often necessary to culture proper hydrocarbon decomposition.

The system employed by Groundwater Technology is illustrated in Figure 3. This clean-up approach involves the use of one or more recovery wells to induce the movement of water and contaminants to a central location for removal from the subsurface. The pumped water is passed through an air stripping tower for the removal of dissolved organics and to promote oxygenation. The oxygen-rich water is then passed to a mixing tank where nutrients are added to promote the enhanced growth of hydrocarbon-utilizing bacteria. The nutrient-rich water is discharged to an infiltration gallery for recirculation through the contaminated zone and back to the pumping well. The recirculated nutrients and oxygen-rich water accelerate the development of a naturally occurring bacterial community that feeds on the adsorbed and dissolved organics. The hydrocarbon utilizers break down the compounds into harmless carbon dioxide and water.

Problem: Treatment of Dissolved Organic Pollutants by
Combined Air Stripping, Carbon Adsorption and Biodegradation

Groundwater Technology conducted a detailed hydrogeological survey to determine the extent of dissolved organics affecting the drinking water of an Eastern community. Leakage from an unleaded gasoline tank had contaminated 10 domestic wells and threatened others as well. Groundwater Technology defined the geologic and hydrogeologic conditions that controlled the movement of the groundwater and developed a workable solution to the problem, which included interim physico-chemical water treatment systems including activated carbon adsorption to minimize bad odors and taste. Pollution abatement is being achieved through a comprehensive program of groundwater flow manipulation, air stripping, and biological degradation of residual dissolved hydrocarbons. At a point when the complete system had been operating only a short time, data indicated a 50-70% reduction in total dissolved hydrocarbons.

Special Problems of Dissolved Chlorinated Organic Solvents

Dissolved chlorinated organic compounds in the subsurface are quickly becoming the spearhead of the fugitive hydrocarbon problem. These specially manufactured organic compounds, whose utilitarian and commercially reproducible chemical configurations allow ubiquitous service to our technologically evolving society, can create situations where the health concerns of impacted parties rise immediately to the forefront, especially when these compounds are lost to the subsurface environment.

Chlorinated organic solvents, notably trichloroethylene, 1,1,1-trichloroethane, and carbon tetrachloride are used in dry cleaning operations, paints, household cleaners, and industrial degreasing compounds for cleaning metal parts and electronic assemblies. They constitute one of the major hazards to ground water because:

- ° They are suspected carcinogens.
- ° They are denser than water and dissolve slightly as they move through an aquifer.

Once they are introduced to the groundwater system, these compounds raise concerns about the long term health impacts that may result from their ingestion and inhalation.

For a given spill, the areal extent and magnitude of the impacts from these compounds are defined in a manner similar to the program outlined in pages 8 through 10. The solution to the problem relies on the comprehensive definition of the soil adsorbed concentrations and the dissolved concentrations. The currently applicable techniques for the treatment and removal of these compounds from the groundwater environment rely on the affinities of the chlorinated organics for adsorption on activated charcoal or synthetic media and on their volatility through an air stripping process. At the current time, air stripping is a reliable, cost effective process for the removal of many volatile organic compounds. The carbon adsorption process also is effective for the removal of certain kinds of chlorinated organics under specific conditions and configurations. (The physical methodology for these processes has been described previously in the section on dissolved hydrocarbons.)

Problem: Contamination of Groundwater by Chlorinated Organic Compounds

In 1979, a Northeastern town of 6,000 lost all of its drinking water to trichloroethylene and other solvent contamination. Solvent levels ranged from 10 to 100 parts per billion. Pending installation of a \$175,000 well that would produce only half as much water as the previous supply, the town had to purchase its water. The town also

faced a \$35,000 loss from water sales to other towns and had to impose water use restrictions, as well as a 50% increase in water rates. Groundwater Technology was contracted to pursue the possibility of restoring the contaminated aquifer.

At two locations, Groundwater Technology conducted a three day air stripping pilot study. Samples analyzed within 24 hours by the Groundwater Technology Laboratory indicated solvent removal of better than 97% from both sites. Based on pilot study results, two 300 gallon per minute air strippers designed by Groundwater Technology for less than \$70,000 will restore this valuable water resource.

SUMMARY

Degradation of the groundwater environment by losses of organic chemicals from underground storage vessels and their impact on the public is and will continue to be an issue of paramount importance. The mitigation of these impacts through the control, and abatement of the contamination can and is being successfully accomplished.

Improved efficiency of the future abatement methods and a decrease in the number and magnitude of such losses will be accomplished by prudent and judicious application of regulatory standards, industrial know-how, and sound scientific principles.

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PROFESSIONAL BACKGROUND

Paul M. Yaniga is a graduate of Lehigh University with an M.S. in geological sciences. He is a certified professional geologist and a member of the National Water Well Association. Currently, Mr. Yaniga is the Principal Hydrogeologist and General Manager of Groundwater Technology, a company specializing in the definition and abatement of groundwater contamination with emphasis on organics and chlorinated organics. He also holds the title of Vice-President of Oil Recovery Systems, Inc., which is the parent company of Groundwater Technology and specializes in the development of groundwater decontamination equipment. Mr. Yaniga has twelve years experience dealing with groundwater contamination and the proper design and placement of solid waste, industrial waste, hazardous waste, and water supply facilities.

During his professional career, Mr. Yaniga has successfully conducted numerous aquifer restoration and pollution abatement projects involving groundwater contamination by immiscible organic, dissolved organic, and inorganic chemicals. His professional experience includes four years as regional hydrogeologist for the Pennsylvania Department of Environmental Resources, with direct responsibility for all aspects of groundwater quality in an industrialized region that is dependent on groundwater supplies. His work has also included groundwater assessment and decontamination projects in Asia, New Zealand, South America, and the Caribbean.

Mr. Yaniga has been a speaker at numerous conferences and has conducted short courses both in the U.S. and overseas. He has prepared groundwater training films and has provided instruction on groundwater contamination problems for local and state regulatory agency personnel in Maine, Pennsylvania, Wisconsin, Ohio, California, Missouri, Illinois, and Louisiana.

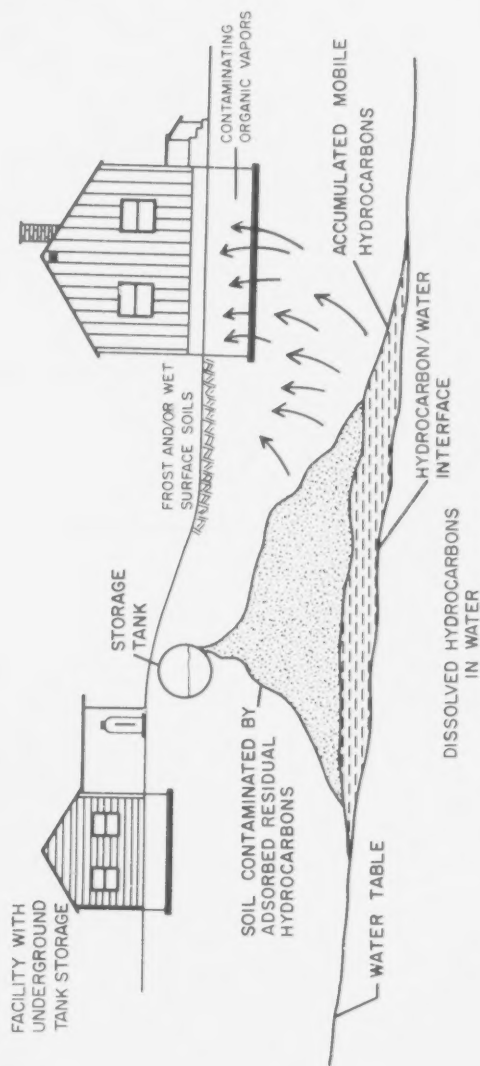
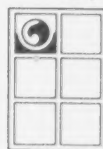


FIGURE 1 TYPICAL IMPACTS FROM SUBSURFACE LEAKS



GROUNDWATER
TECHNOLOGY

CONSULTING GROUNDWATER GEOLOGISTS

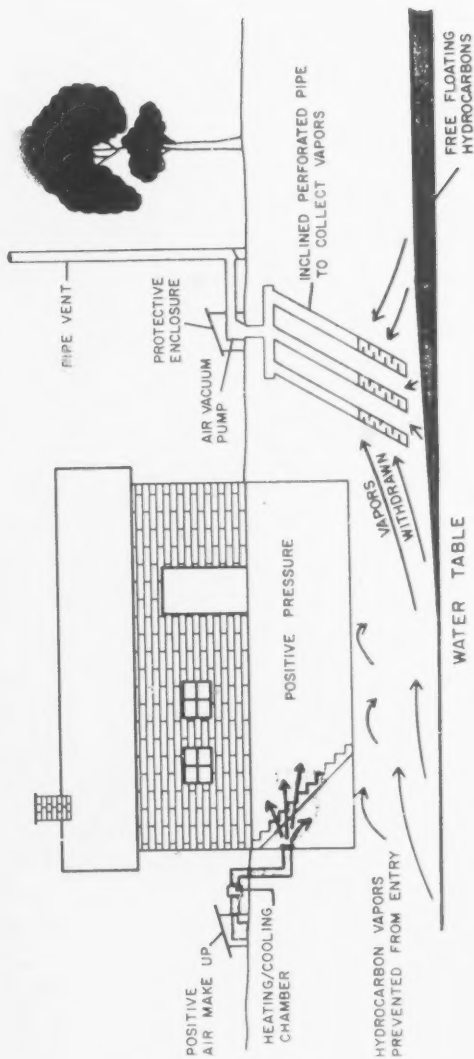


FIGURE 2 GENERALIZED VIEW OF SOIL VENT SYSTEM



GROUNDWATER
TECHNOLOGY
CONSULTING GROUNDWATER GEOLOGISTS

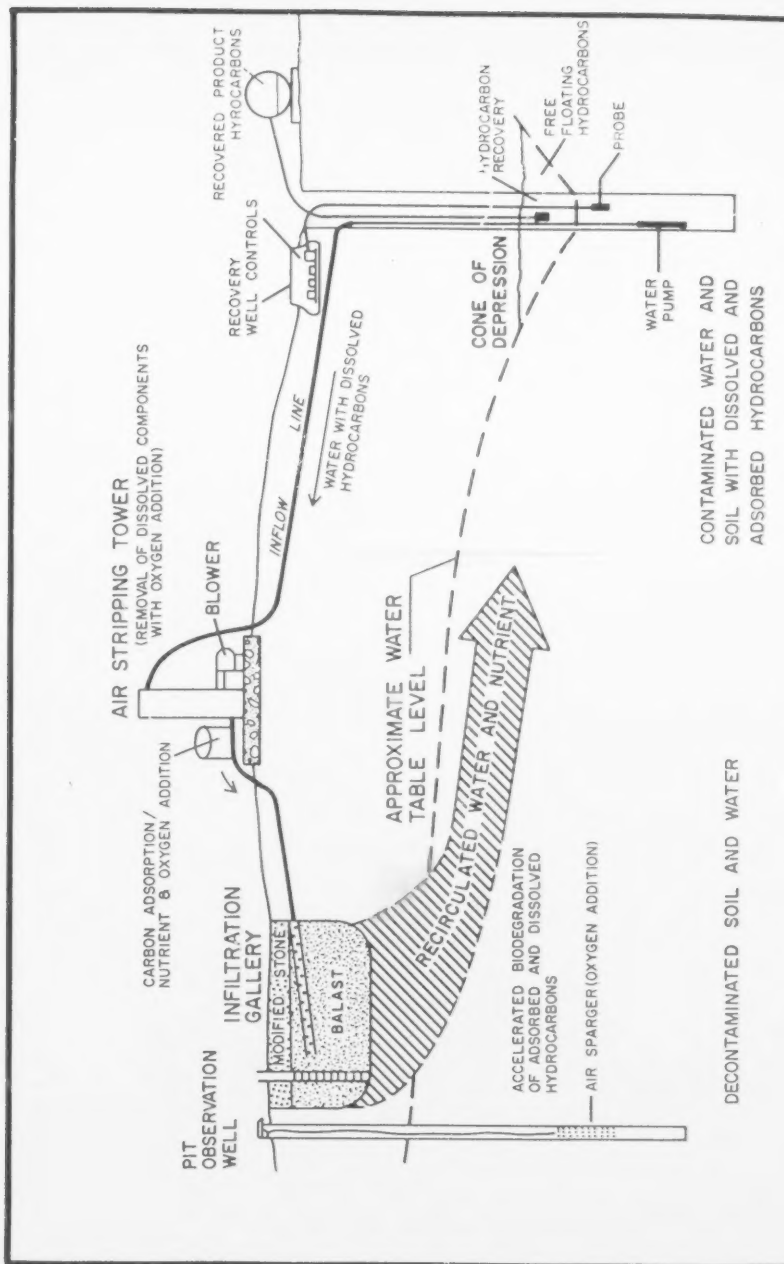
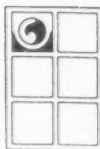


FIGURE 3 CROSS SECTION OF CLEAN UP

GROUNDWATER
TECHNOLOGY

CONSULTING GROUNDWATER GEOLOGISTS

COMMENTS
OF THE
NATIONAL ASSOCIATION OF CONVENIENCE STORES,
NATIONAL OIL JOBBERS COUNCIL,
SERVICE STATION DEALERS OF AMERICA, AND
SOCIETY OF INDEPENDENT GASOLINE MARKETERS OF AMERICA
ON THE
REGULATION OF UNDERGROUND STORAGE TANKS
CONTAINING SUBSTANCES OTHER THAN HAZARDOUS WASTE
BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

March 1, 1984

My name is Michael T. Scanlon, Jr. I am Vice President for Policy and Analysis for the National Oil Jobbers Council ("NOJC"). I appear today on behalf of NOJC, the National Association of Convenience Stores ("NACS"), the Service Station Dealers of America ("SSDA"), and the Society of Independent Gasoline Marketers of America ("SIGMA"). The independent, small business petroleum marketers represented by these trade associations (hereinafter "petroleum marketers") distribute and retail approximately 85 percent of the motor fuels and home heating oil consumed in this country. Petroleum marketers have been concerned with underground petroleum product leakage for years. As members of communities and the public-at-large, petroleum marketers are aware of the potential environmental and safety and fire hazards associated with unconfined petroleum products. Moreover, as businessmen who own and/or operate underground storage tank and piping systems, they know that underground leaks are costly in terms of inventory losses, system replacement or repair, product recovery and clean-up, and liability for damages. Petroleum marketers, thus, have no incentive to have underground leaks occur at their retail motor fuel outlets. Accordingly, petroleum marketers actively have sought to reduce leak incidences through preventative measures, such as inventory control.

Underground leaks, like automobile accidents and fires, occur and will continue to occur. The regulation of underground tank and piping systems at retail motor fuel outlets will not solve the underground leakage problem any more than legislating safety standards only for General Motors automobiles will reduce significantly the number of traffic fatalities. Because underground storage tanks at retail motor fuel outlets do not comprise a majority of the tanks buried across the United States, it is necessary to identify and characterize the universe of underground storage tanks to determine the extent of the threat — real or potential — to the Nation's groundwater supplies. Protection of the environment and public health and safety cannot be achieved

unless all underground storage tank owners and operators are aware of the need to prevent underground leaks.

The "backbone" of any underground storage tank leak prevention program is rigid inventory control. Inventory control is a cost-effective approach that provides a day-to-day reading on the condition of underground tank and piping systems. While such controls may not prevent a leak, they are effective in minimizing losses, clean-up costs, and potential liability for damages. Moreover, inventory controls, will not disrupt competition in the motor fuels marketplace and should not place a financial burden on either commercial or private owners and operators of underground tank and piping systems.

The Senate Committee on Environment and Public Works ("Committee") has drafted an amendment to the Safe Drinking Water Act providing, among other things, for the registration of underground storage tanks; release detection, prevention, and correction regulations; and performance standards for new underground storage tanks. The amendment may be offered for consideration by the Senate during upcoming floor debate on S.757, the Solid Waste Disposal Act Amendments of 1983. Generally, petroleum marketers prefer a uniform, national regulation to a crazyquilt pattern of state and local rules. However, petroleum marketers fear that the Committee's amendment, if enacted, will create confusion surrounding the complex issue of underground leakage. Accordingly, petroleum marketers urge the Committee to consider carefully the effects of their amendment on state and local governments, as well as owners and operators of underground storage tanks. The Committee's amendment should not "reinvent the wheel."

INTRODUCTION

National Association of Convenience Stores

NACS is a national trade association comprised of 900 retail company members. Approximately, 46 percent of these NACS members sell motor fuels at more than 17,000 convenience stores. Nearly all of these motor fuels are dispensed through self-service pumps. In many instances, however, NACS members do not own the underground tanks and piping systems at their retail locations. At such locations, a NACS member typically enters into an arrangement with another petroleum marketer whereby the petroleum marketer installs and maintains the motor fuels storage and dispensing equipment and retains title to the product in the underground storage tanks. The NACS member oversees the dispensing of product and collects for each sale. The NACS member receives a percentage of each sale for its services and remits the balance to the petroleum marketer. Increasingly, NACS members are purchasing the underground tank and piping systems at their convenience stores.

National Oil Jobbers Council

NOJC is a federation of 42 state and regional trade associations representing more than 11,500 independent small business petroleum marketers. Members include gasoline and diesel fuel wholesalers, commissioned distributors of gasoline, gasoline reseller-retailers, and a large number of retail fuel oil dealers. Members also wholesale or retail many other petroleum products, including kerosene, LP gas, aviation fuels, motor oils, and residual fuel oil. Together, NOJC's members market approximately 50 percent of the gasoline and 85 percent of the home heating oils sold in the United States under either their own private brand or the trademark of their supplier. NOJC members own approximately 65,940 retail motor fuels outlets.

Service Station Dealers of America

SSDA is a national trade association representing 60,000 independent service station dealers across the country. Nearly all of these dealers retail motor fuels under the "flags" of major-brand refiners (i.e., Exxon, Shell, Chevron, Arco and Gulf). The majority of SSDA's members operate full-service facilities. While most of SSDA's members lease their retail outlets from their suppliers, an increasing number own their facilities, including the underground tank and piping systems.

Society of Independent Gasoline Marketers of America

SIGMA is a national trade association of approximately 250 independent marketers and private-brand chain retailers of motor fuels. SIGMA's members market motor fuels in 49 states, and their sales of motor fuels represent approximately 15 percent of the gasoline sold to the retail market. SIGMA's members are among the most efficient retailers of motor fuels in the world. The operating around the marketing concept of high volume/low margin, coupled with other marketing efficiencies, permits SIGMA's members to distribute motor fuels at the lowest possible price by minimizing the amount of fixed costs which must be recovered in each gallon of product sold. Private-brand marketers historically have served as the cutting edge in the retail market for motor fuels. SIGMA members own and operate approximately 10,600 retail motor fuel outlets.

DISCUSSION

I. Petroleum Marketers Have No Incentive For Underground Leaks At Their Retail Motor Fuel Outlets

Underground leakage of hazardous materials and petroleum products is not a new problem. While the petroleum industry has experienced underground product leaks, petroleum marketers have been and continue to be concerned with this problem and have

participated and continue to participate in ongoing industry efforts to prevent and minimize such leaks.

Petroleum marketers' concern with unconfined petroleum can be attributed to several factors. First, they have no incentive to have underground leaks occur at their retail motor fuel outlets. The price of motor fuels has trebled during the past ten years. Underground product leakage, thus, is costly to petroleum marketers merely from the standpoint of inventory losses. Given the narrow profit margins on motor fuels sales, small losses of product can have serious consequences for a petroleum marketers' profitability. Petroleum marketers, therefore, have every incentive to minimize the potential for underground leaks.

Second, motor fuels marketing has undergone a radical change since the early 1970s. Most notable has been the decline in the number of retail outlets and the shift to self-service sales. The changes in the number of outlets, the mix of fuels and other products sold, and the design and remodeling of outlets has been in response to changing consumer preferences. Petroleum marketers have responded to consumer demand for speedy service and convenience by constructing or remodeling retail motor fuel outlets with multiple-pump islands capable of higher monthly product throughputs. Accordingly, petroleum marketers have invested considerable sums on underground tank and piping systems necessary to accommodate these new marketing patterns.

Third, awareness of the potential environmental and safety and fire hazards associated with unconfined petroleum products has risen with the passage of environmental laws and regulations and revisions to fire codes governing the installation of underground tank and piping systems. Regulatory initiatives to abate underground leakage problems have increased as underground tanks and piping systems installed during

the 1950s and 1960s have begun to leak or are expected to leak in the near future due to corrosion.

In response to this concern, petroleum marketers have worked and continue to work to develop effective approaches to prevent and minimize underground leakage through improved installation, detection, and "housekeeping" practices. Petroleum marketers have participated and continue to participate on technical committees on the this issue coordinated by the American Petroleum Institute. SIGMA and NOJC routinely have sponsored underground leakage seminars at their annual and midyear conventions and have reported on the leakage issue in membership newsletters and magazines.^{1/} Because of this concern for and involvement in the underground leakage issue, petroleum marketers are well qualified to discuss this subject.

II. The Universe of Underground Storage Tanks And Their Owners and Operators Needs To Be Identified

There is little more than anecdotal evidence as to the threat to groundwater supplies from leaking underground storage tanks. No reliable data exist as to the number of underground storage tanks in the United States, their ownership and use, and number that are leaking. Therefore, it is necessary to identify and characterize the universe of underground tanks and their owners and operators.

Petroleum marketers probably own and operate less than one-half of the underground storage tanks in the United States. Estimates of the underground storage tank population range from 1.2 million to 3 million, excluding home heating oil tanks.

^{1/} For example, SIGMA has sponsored four leak seminars at its semi-annual meetings since May 1981 and has published eight newsletter articles on the issue during this same period. NOJC also has sponsored four leak seminars at its semi-annual meetings over the last three years and has published six stories in its national publication during this same period. Both organizations have standing operations and engineering committees which work the underground leakage issue.

According to the Lundberg Letter, there were 210,875 locations in 1982 where any motorist could drive in and buy gasoline.^{2/} Lundberg Survey, Inc., "Lundberg Letter" (September 2, 1983). Petroleum marketers own or operate approximately 90 percent of these outlets, representing about 600,000 tanks. Not included in the Lundberg study, however, are dispensing facilities serving car rental companies; car, truck, and taxi fleets; state, county, and local governments (i.e., police and fire departments, highway departments, boards of education); the Federal Government (i.e., military bases and post offices); farms; hospitals (i.e., fuel tanks for emergency power generation and heat); and business and industry. It is difficult to estimate the number of underground tanks at these non-retail facilities. However, it is reasonable to assume that the total far exceeds the number owned or operated by petroleum marketers.

In assessing the need for the regulation of underground storage tanks, it is essential for Congress to understand that the regulation of only petroleum or those tanks at retail motor fuel outlets will not solve the underground leakage problem. Moreover, petroleum marketers are ahead of most other tank owners and operators in following good housekeeping practices because they have a stronger incentive to prevent and minimize leakage. Thus, petroleum marketers emphasize that any regulation of underground storage tank and piping systems be applicable to all such systems.

Petroleum marketers support efforts to conduct a census or inventory of underground storage tanks. The results of such survey should validate that underground storage tanks at retail motor fuel outlets do not comprise the bulk of the tank population. However, any registration of tanks should apply to all underground tanks.

^{2/} Of this total, approximately 93,400 were conventional service stations, 67,300 were gasoline-only outlets, 23,700 were convenience stores, 14,100 were automotive service facilities, 11,100 were car washes, 2,100 were department stores, 1,200 were truck stops, and 3,000 were miscellaneous outlets (i.e., farm stores, food stores, restaurants, and hotels and motels).

Exemptions from such a registration program will diminish attempts to make owners and operators of underground storage tanks aware of the need to prevent and minimize leaks. Moreover, the Committee's amendment (section 1459) provides for a two-year study of underground tanks exempted from the registration requirement, including estimates of the number and locations of such tanks. Rather than conducting an expensive study to determine such estimates, it would be more effective for all tank owners and operators to register their underground storage tanks. Registration notices could be sent with property tax or similar mailings.

Petroleum marketers, despite their support for a tank inventory, have several problems with the tank registration program in the Committee's amendment. Section 1452(a) requires an owner or operator of an underground storage tank to include as part of his notification "any previous releases" from the tank and its connective piping. Given the proposed definition of the term "release" (i.e., spilling and emitting) and the interpretation of the terminal end for connective piping (i.e., dispenser nozzle), an owner or operator would have to report driveway spills by self-service customers and refueling emissions from every transaction. Such a result is not the intent when the amendment concerns the regulation of underground storage tanks. In addition, the requirement for registration of abandoned tanks is burdensome for petroleum marketers. Given the deactivation rate for retail gasoline outlets since 1972, the information to be contained in the notice may not be available. Many tank owners and operators have gone out of business and may not have notice of the amendment's requirements. Moreover, petroleum marketers have bought and sold retail outlets and may not know the disposition of the underground tank and piping systems.

III. The Committee's Amendment Should Not Confuse An Already Complicated Issue

The Committee, in attempting to address the underground leakage issue, should not attempt to "reinvent the wheel." The petroleum industry, state and local governments, and fire and building code groups actively have been working to prevent and minimize underground leaks. Because of the complexity of this issue and recognized differences in local conditions, underground tank regulations have developed in a crazyquilt fashion. Generally, petroleum marketers prefer a uniform, national regulation to conflicting state and local rules. However, the Committee's amendment may confuse, rather than clarify, the underground leakage issue. The Environmental Protection Agency ("EPA"), in developing regulations and performance standards, may choose to ignore totally the recommended practices that have been developed to prevent, detect, and clean-up underground leaks or it may adopt standards that are excessive for the protection of the environment and public health and safety in particular areas of the country. As a result, petroleum marketers may be faced with compliance problems. For example, the National Fire Protection Association's "Flammable and Combustible Liquids Code" ("NFPA 30") is the basis for Occupational Safety and Health Administration ("OSHA") workplace safety standards for retail motor fuel outlets. If EPA's regulations and standards differ from NFPA 30 (e.g., requiring tank leak detection systems in lieu of inventory controls), a petroleum marketer may be in violation of OSHA rules.

A petroleum marketer's compliance problems will be compounded because of the lack of clear enforcement authority and funding in the Committee's amendment. The amendment (section 1457) provides for state programs that may be administered by a fire marshal, environmental or water quality office, weights and measures office, or any agency designated by a state's governor. The resources and capabilities of these officials and agencies vary greatly. Thus, the Committee's amendment, without any funding for enforcement, may exacerbate enforcement and compliance problems.

Petroleum marketers also are concerned that the Committee's amendment does not distinguish between the responsibilities of owners and operators of underground storage tanks. The amendment should make clear that an operator is responsible for inventory controls and notification to the tank's owner of any unexplained variances. The amendment also should state that the tank owner is responsible for proper installation, testing after notification of inventory variances, and abandonment. A petroleum marketer who owns the underground storage tank on the premises of a bulk-end user should not be held accountable for that operator's failure to maintain proper inventory controls or notify him of unexplained variances. There is no incentive for that customer to follow proper practices if he knows that the tank's owner will be held responsible for his omissions. Accordingly, the Committee's amendment should distinguish between the responsibilities for owners and operators of underground storage tanks as appropriate.

IV. Inventory Controls Must Be The "Backbone" of Any Underground Storage Tank Regulations

Like traffic accidents and fires, it is impossible for Congress to legislate underground tank leaks out of existence. Leaks will continue to occur, but their frequency and scope can be minimized through proper prevention and detection methods. The "backbone" of any underground storage tank regulations must be rigid inventory control.

Petroleum marketers recognize the necessity of establishing and using an inventory accounting system to minimize stock losses. Because of the nature of petroleum products, stock losses, to some extent, are unavoidable. For example, differences in temperature between product being delivered and product already in an underground tank will cause a temperature change after delivery. If the temperature of the stored product drops, the volume will decrease, resulting in a shrinkage loss. Conversely, a rise in temperature results in product expansion. In addition, it is virtually

impossible to calibrate the meter of a motor fuel dispenser to achieve and maintain 100 percent accuracy. Accordingly, weights and measures codes have established legal tolerance levels for motor fuel dispensing meters so that customers, on balance, receive full measure when they purchase product. Because such variances cannot be controlled by the operator of a retail motor fuels outlet, some variation in inventory levels is expected. However, according to recommended industry practice, such losses generally should not exceed 0.5 percent or five gallons for every 1,000 gallons delivered. American Petroleum Institute, "Recommended Practice for Bulk Liquid Stock Control at Retail Outlets, 3d Ed." (1977), p.3. Retail outlet operators who notice sudden, unexplained variances from an established pattern or small but growing losses know that a stock loss may be occurring due to a leak, spills, theft, or product used on the premises. Current industry practice recommends that the operator first check for a leak or notify the tank's owner to check for a leak.

Petroleum marketers advocate a rigid inventory control program as the central element of a leak prevention and detection program because, while it involves little cost, it is reliable. A good inventory program will detect most leaks before any appreciable amount of product can escape from a tank. Daily reconciliation of inventory records provides an ongoing monitoring of the underground tank and piping system at a retail motor fuel outlet. Inventory control requirements already have been incorporated in fire codes, as well as OSHA regulations.

More importantly, an inventory control program will not cause competitive distortions in the motor fuels marketplace that accompany other leak detection systems. For example, tank leak detectors, monitoring wells, and other devices might be installed to monitor for underground tank and piping system leaks. However, the cost of such systems does not make a petroleum marketer more competitive. The expense of these systems, particularly for a small petroleum marketer, often exceed their

effectiveness, particularly when compared with inventory controls. Accordingly, the Committee's amendment (section 1453(a)(2)) should be reworded to make it clear that the performance standards to be established by the Administrator of the Environmental Protection Agency require inventory controls. Other leak detection systems should supplement, rather than substitute for, inventory controls.

V. Periodic Tank Inspections Should Not Require Tank Tightness Tests

Section 1453(a)(6) of the Committee's amendment requires periodic inspection of underground storage tanks as part of an adequate enforcement program. Because underground tank and piping systems normally cannot be entered for inspection, petroleum marketers fear this provision mandates periodic tank tightness tests. Such tests are not as effective as inventory controls, and their cost will cause competitive distortions in the motor fuels marketplace.

Periodic tank tightness testing generally costs \$500 per tank for the commonly available tests and involves the closing of a motor fuel outlet for up to a full day. Based on the population of retail motor fuel outlets cited above, a one-time tank tightness testing requirement would cost petroleum marketers alone nearly \$500 million. Included in this estimate are lost sales while the facility is closed. Moreover, the tanks must be filled with product in order to be tested. An operator who normally does not keep his underground storage tanks full must buy \$10,000-\$15,000 of product to top-off the tanks. While this expense will be recovered in later sales, the petroleum marketer must pay for the product in advance. For many petroleum marketers, such costs are burdensome, particularly when a tank tightness test is like having a smoke detector in your house one day a year. The test will not tell a tank owner or operator if there is a leak three weeks after the test is performed. Further, an operator whose tanks are tested and found to be tight may become lax in his use of proper inventory controls.

Under current industry practice, tank tightness tests are appropriate where inventory reconciliations indicate a product loss that may be attributable to leakage. Such tests are recommended in fire codes once a leak is thought to exist and inventory records cannot explain a variance. See, e.g., National Fire Protection Association, "Underground Leakage of Flammable and Combustible Liquids-1983," (NFPA Code 329). Accordingly, petroleum marketers strongly oppose any performance standard that mandates periodic tank tightness testing.

VI. Financial Responsibility Measures

Petroleum marketers oppose section 1456 of the Committee's amendment relating to response to releases. Essentially, the amendment would extend the liability provisions under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) to the clean-up of any release using monies from the Federal Superfund. Recent court decisions interpreting the liability sections of CERCLA suggest that petroleum marketers could be held liable for any and all response costs where they delivered petroleum products to underground storage tanks at non-retail facilities and where they were unaware of the leaks or were misled as to the condition of the tanks. Further, petroleum marketers could be jointly or severally liable for the clean up of tanks abandoned by former customers. This type of precedent has serious ramifications for thousands of petroleum marketers.

Petroleum marketers do support financial responsibility measures, such as insurance for bodily injury and property damage to third parties caused by sudden or non-sudden underground leaks. While most comprehensive general liability policies protect against sudden occurrences, non-sudden protection has been available for less than two years. Despite the expense of non-sudden environmental impairment insurance, many petroleum marketers already have availed themselves of such coverage. However,

because of the lack of sufficient claims history on which to base rates, premiums for non-sudden leak insurance can be expected to remain high for several years. Moreover, such financial responsibility measures, combined with rigid inventory controls, should be adequate to obviate the need for extending CERCLA's liability provisions to underground petroleum leaks, because most leaks will be small and should remain confined to the property of the motor fuel outlet.

VII. Conclusion

Petroleum marketers have no incentive to have underground leaks occur at their retail motor fuel operations and have taken steps to minimize such leaks. Any regulation of underground storage tanks should address all underground tanks and must have an inventory control program as its "backbone." Petroleum marketers oppose other performance standards, such as periodic tank tightness testing, which will distort the competitive structure of the motor fuels market. Any regulations and performance standards to be developed by EPA should not "reinvent the wheel." While petroleum marketers support financial responsibility measures, they oppose the extension of CERCLA liability provisions to underground tank leaks.

TESTIMONY OF WILLIAM O'KEEFE
VICE PRESIDENT, AMERICAN PETROLEUM INSTITUTE
BEFORE
THE COMMITTEE ON ENVIRONMENT AND
PUBLIC WORKS OF THE UNITED STATES SENATE

March 1, 1984

Mr. Chairman, members of the Committee: my name is William O'Keefe. I am a Vice President of the American Petroleum Institute, a trade association serving 6,000 individuals and 235 corporate members involved in all facets of the petroleum industry.

Those members have divergent views on many issues. But, on the subject before this committee, API member companies are united in their determination to deal effectively with the potential threat to groundwater posed by leaking underground storage tanks.

We are sensitive to accounts of individuals and families whose water supplies have been contaminated. As members of society, we have a deep concern for -- and a commitment to -- protecting the quality of our water supplies. We know that groundwater serves as the source of drinking water for roughly one half of the population of the United States. And we recognize the importance of groundwater in meeting the needs of industry and agriculture. Anything which damages the integrity of the groundwater system, then, threatens the quality of life in this country.

In addition to these general social concerns, there is a very strong self-interest motive operating. We know that the leak of

petroleum products into the environment constitutes the loss of a valuable resource. Unlike toxic wastes, which may have been dumped or abandoned because they have no market value, petroleum is an expensive commodity. Leaks represent a financial loss to producers and retailers. The industry has, then, a financial interest in the integrity of our storage systems.

The result of our concern has been an industry-wide effort designed to prevent, detect and, where necessary, mitigate the effect of leaks. As a result, these efforts have prevented all but a small percentage of leaks from damaging drinking water supplies -- and contamination of water supplies, of course, is the important issue. I'd like to take a few moments to describe what the petroleum industry has been doing to deal with the issue on its own and in cooperation with state and local government. I think it will become apparent that we were active in this area even before it became an issue of public concern.

First, I want to describe what we have done in the areas of prevention and detection. The tanks which we now suspect are most susceptible to failure were initially believed to be secure for up to 40 years. Now we know that a number of localized factors can affect the life of a tank. Soil acidity, moisture and other physical conditions may cause non-uniform corrosion and with it to a risk of potential water contamination in a much shorter period.

In addition to individual company efforts, API, acting for the industry has had a program to help communities handle fuel leak incidents since 1969. We have provided technical assistance

to local governments in developing programs to prevent leaks which might be damaging and to safely handle those that do occur. Since 1975, we have increased our emphasis on both prevention and detection. In addition to making dealers and local communities aware of the issue, we have developed Recommended Practices which treat everything from tank installation through tank removal. We have placed special emphasis on effective inventory control because we believe it offers the most effective detection technique. We know that early corrective action can prevent a substance from reaching the groundwater. Because inventory control is a daily activity, we believe that it should be a primary tool in this program. Other approaches -- like periodic tank testing -- do not provide a continuous means to detect a problem.

Beyond that, the industry -- through API and individual companies -- has been engaged in research to develop more secure storage systems. Tanks made of or lined with non-corrosive material or cathodically protected steel represent the state of the art for containment. Along with advances in piping, pumping systems, testing technology, observation wells and secondary containment systems, the industry has voluntarily developed the materials, standards and the procedures which will minimize the potential risks of leaks in the future.

That effort has not been inexpensive. Our member companies have spent literally hundreds of millions of dollars in research and, more significantly, in tank replacement programs. Many of

our members are engaged in aggressive programs to replace existing storage tanks.

These efforts by the petroleum industry, demonstrate a serious commitment to deal with the potential problem of groundwater contamination. Although our member companies have been active in developing means to prevent leaks and to deal with those that occur promptly and effectively, there are gaps in our knowledge. As this Committee proceeds with its deliberations, we suggest that your efforts be directed at better defining the nature and scope of the problem. Let me identify three such gaps as evidence that it is poorly understood.

Number one, no one knows how many commercial size, underground storage tanks there are in the United States. Rough estimates put the number at 2 million -- and that figure does not include residential tanks. While we have no definitive industry data, we are reasonably confident that no more than 700,000 tanks belong to gasoline retailers; about 50 percent of those owned by the major oil companies. The other million or so tanks are owned by a number of different parties. The federal government owns a good many of them: some are located on military bases, at GSA service centers, and at federal buildings including the Capitol. Beyond the federally owned tanks, underground commercial storage systems are typically located on farms, in police and fire stations, and in the headquarters of taxi fleets and rental car concerns. In addition, public utilities own an unknown number of underground tanks as do a host of other commercial concerns which use them as "convenience tanks" to service their vehicle fleets

or for other similar purposes. We know the many kinds of organizations which own tanks; but we do not know how many tanks there are or what programs are in effect to protect their integrity.

Number two, without underestimating the potential seriousness of a leak, no one knows how many tanks are leaking or most importantly, the relevance of that number to incidents that damage drinking water resources. Although we don't collect statistics on this subject, information from some of our member companies as well as firms involved in the business of cleaning up leaks, suggest that the great majority of leaks are detected and dealt with before they create a serious problem.

These uncertainties do not, of course, diminish the legitimate concern that the public and the Congress feels. But they do indicate some of the difficulties associated with fashioning any effective legislative remedy now.

For example, this hearing -- and the legislation before the Committee -- focuses on underground storage tanks as a source of groundwater contamination. While tank failures can be a potential problem, the bulk of scientific evidence indicates that the major threat to groundwater comes from industrial wastes, municipal landfills, agricultural chemicals and septic system and cesspool effluents. Legislation which focuses only on underground tanks may involve a major commitment of resources without getting at the major causes of contamination. While failures of underground tank systems need to be corrected, any meaningful federal legislative effort to protect groundwater must go well

beyond commercial tanks in general or petroleum tanks in particular.

Based on our experiences in dealing with underground tanks, we believe there are a number of principles which the Committee might want to consider as you decide what sort of federal response might -- or might not -- be appropriate and effective.

First, since the risk and consequences of leaks vary from one area to another, a localized or flexible response is the best solution. Even if the same amount of gasoline were leaking in different areas, the real risks would vary depending on factors like: the nature of the soil, the proximity of the leak to underground waters, the location of households served by wells, the nature of the aquifer, the time from leak to detection, and a host of other variables.

Because of the substantial differences involved, we have found that states are in the best position to establish reasonable and effective regulations. For example, approximately 42 states have adopted the basic principles established in the National Fire Protection Association's Code Book #30, aspects of which address tank system integrity. API worked closely with the Association in developing this code and we fully endorse it's emphasis on strict inventory control.

In addition to these fire and safety efforts, 19 states now have laws and regulations governing other facets of tank performance. In other areas, local ordinances control tanks. For example, in Dade County, Florida, at the request of the local authorities, we were actively involved in a cooperative effort to

develop regulations and standards which effectively respond to the needs of that particular area. In that case, and others like it, we have been able to make real progress precisely because we adapted to unique local circumstances and because all the parties involved acted in a spirit of constructive cooperation.

We obviously believe that addressing problems at the state and local level is the right approach to take. But if federal involvement is required, we strongly urge that it take the form of performance standards. That is our second principle. We believe that API's Recommended Practices -- a copy of which I would like to submit for the record -- could serve as a model for any regulatory effort. In that context, I would point out that a prime objective of API's Recommended Practices is to protect groundwater through a combined system of prevention, detection and mitigation. Our efforts to achieve that goal must involve control of tank leaks; but it would be wrong -- and dangerous -- to premise those efforts on the belief that any leak means that groundwater will be contaminated.

In that same context, it would be misguided to believe that controlling service station tank leaks alone means that groundwater is protected. As I indicated earlier, the petroleum industry owns only a small percentage of the tanks now in place. The scope of this problem goes well beyond your local service station. And a program to control leaks must also go beyond the petroleum industry.

If legislation is enacted then it needs to reach the entire population of underground tanks. And that includes the tanks

owned by federal and state governments, small business, farmers, utilities and other private establishments along with those owned by the petroleum industry. Our third principle, then, is that if there is to be legislation to control underground tanks, no one should be exempted from it. It would be ineffective and inequitable to develop an approach which focused on the petroleum industry alone since we are not the major actors here, though we are the actors who have played a major role in correcting one aspect of the problem.

Fourth, the costs associated with cleaning up any existing or future spills, should be borne by those who control the tanks involved. This is a reasonable principle which need not impose an unreasonable burden on anyone. Insurance is currently available. Owners of underground storage tanks should have such insurance or they should be able to demonstrate a self-insurance capacity. My point is simply that those who have been responsive, who have seen a problem and acted to correct it, should not be held accountable for the inaction of others.

Finally, the entire issue of underground storage tanks needs to be kept in perspective. While clearly they constitute a potential problem, I firmly believe that the petroleum industry has acted to prevent and minimize the danger which they can cause. The concern that we have expressed and the dollars we have committed have been translated into an effective contribution to social and environmental safety.

I would hope that before any sweeping reforms are adopted, a serious effort is made to gather the data that is required to

better define the problem. It is hard to draw up effective proposals when the specific dimensions of the problem have not been defined and verified. It is hard to make workable plans when the precise nature of the threat is still undetermined. I would hope that in this case we would act cooperatively and in a way which is consistent with the level of knowledge we now possess.

Thank you very much. I will be happy to try to answer any questions you may have.

API RECOMMENDED PRACTICE FOR UNDERGROUND
PETROLEUM PRODUCT STORAGE SYSTEMS
AT MARKETING AND DISTRIBUTION FACILITIES

Foreword

The prevention and detection of product leakage from petroleum storage and dispensing systems is important to both industry and the public. This recommended practice is offered as a guide for voluntary use by architects, engineers, marketers, jobbers and contractors in the design, use and maintenance of such systems.

Federal, state and municipal codes or laws may have specific restrictions or requirements which must be taken into account prior to the installation of the underground tanks and piping.

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API RECOMMENDED PRACTICE FOR UNDERGROUND
PETROLEUM PRODUCT STORAGE SYSTEMS
AT MARKETING AND DISTRIBUTION FACILITIES

Scope

This recommended practice covers measures necessary for the prevention and detection of leaks from underground petroleum product storage tank systems, as defined in 2.1, at marketing and distribution facilities, as defined in 2.2.

1. General Provisions

- 1-1 This recommended practice applies to underground petroleum product storage tank systems at marketing and distribution facilities except fuel oil containers of less than 1100 gallons capacity connected to burning equipment, and underground storage tanks for liquefied petroleum or natural gases.
- 1-2 In particular installations, the provision of this recommended practice may be altered at the discretion of the authority having jurisdiction after consideration of the special features such as topographical conditions, barricades, walls, water tables, soil conditions, and proximity to buildings and adjoining property.

2. Definitions

- 2.1 UNDERGROUND PETROLEUM PRODUCT STORAGE TANK SYSTEMS means tanks totally buried underground and the related system composed of storage tank(s), product line(s) to dispensing pump(s), vent line(s), tank fill line(s), dispensing pump(s), dispenser(s), and associated appurtenances for the storage or dispensing of petroleum products. This recommended practice does not apply to aboveground storage tanks that are partially buried or below grade which are in compliance with other Fire and Safety codes, and are excluded in section 1-1.
- 2.2 MARKETING AND DISTRIBUTION FACILITY shall mean retail, commercial and private facilities that store and dispense flammable or combustible liquids to consumers. This recommended practice does not apply to distribution centers with aboveground tankage or to product pipelines, both of which are covered by other standards.

- 2-3 AUTHORITY HAVING JURISDICTION shall mean the organization, office or individual responsible for "approving" equipment, an installation or a procedure.
- 2-4 COMBUSTIBLE LIQUID shall mean a liquid having a flash point at or above 100°F (37.8°C).
- 2-5 FLAMMABLE LIQUID shall mean a liquid having a flash point below 100°F (37.8°C) and having a vapor pressure not exceeding 40 pounds per square inch (absolute) at 100°F (37.8°C) and shall be known as a Class I liquid.
- 2-6 LISTED shall mean equipment or materials included in a list published by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.
- 2-7 OPERATOR shall mean the lessee or person(s) in control of and having responsibility for the daily operation of the facility for the storage, use or dispensing of flammable and combustible liquids.
- 2-8 OWNER shall mean the person(s) who owns the tank storage system used for the storage, use or dispensing of flammable and combustible liquids.
- 2-9 PRODUCT LINE LEAK DETECTOR shall mean a device used to detect product or pressure losses in a pressurized product line of a remote pumping system.
- 2-10 REMOTE PUMPING SYSTEM shall mean a pressurized product line system in which flammable or combustible liquids are supplied to a point(s) away from the tank(s) by means of a pumping unit(s) in or on the storage tank(s).
- 2-11 SUCTION PRODUCT SYSTEM shall mean a non-pressurized product line system in which flammable or combustible liquids are removed from the storage tank(s) by means of a pumping unit(s) located at a point(s) away from the storage tank(s).
- 2-12 PRODUCT HANDLING SYSTEM shall mean a system composed of storage tank(s), product line(s), vent line(s), tank fill line(s), pump(s), dispenser(s), and other associated appurtenances, for the storage, use or dispensing of flammable or combustible liquids.

- 2-13 OBSERVATION WELL shall mean a dug or drilled, cased well which can be used for detecting the presence of flammable or combustible liquids and which is drilled to a depth of approximately 24 inches below the tank bottom.
- 2-14 SECONDARY CONTAINMENT shall mean an impervious barrier installed such that any volume of material leaked from the storage system will be prevented from reaching the lands and/or water outside the impervious barrier for the anticipated period of time necessary for the detection and recovery of the spilled material.

3. Prevention

3-1 Underground Tank Selection and Installation

3-1-1 New Facilities

- 3-1-1-1 Tanks shall be designed and built using noncorrosive material or cathodically protected steel.
- 3-1-1-2 A steel system as described in 3-1-1-1 shall be cathodically protected by an impressed current cathodic protection system, sacrificial anodes, or some other type of equivalent protection. If a cathodic protection system is used, it shall be maintained in accordance with 4-2-2-5.
- 3-1-1-3 Cathodically protected steel or approved noncorrosive coated steel underground tanks shall be set on a firm base and surrounded with at least 12 inches of noncorrosive inert material such as clean sand or gravel, well tamped in place. The tank shall be placed in the hole with care, since dropping or rolling the tank into the hole can break a weld, puncture or damage the tank, scrape off the protective coating of coated tanks, or damage any attached cathodic protection.
- 3-1-1-4 Cathodically protected steel or approved noncorrosive coated steel underground tanks shall be covered with a minimum of 2 feet of sand or shall be covered with not less than

1 foot of sand on top of which shall be placed a slab of reinforced concrete not less than 4 inches thick. When they are, or are likely to be subjected to traffic, they shall be protected against damage from vehicles passing over them by at least 3 feet of earth cover, or 18 inches of well-tamped earth plus 6 inches of reinforced concrete or 8 inches of asphalt paving. When asphalt or reinforced concrete paving is used as part of the protection, it shall extend at least 1 foot horizontally beyond the outline of the tank in all directions.

3-1-1-5 Nonmetallic underground tanks shall be installed in accordance with the manufacturer's instructions. The minimum depth of cover shall be as specified in 3-1-1-4.

3-1-1-6 The entire installation shall comply with the latest requirements of either NFPA 30 Flammable and Combustible Liquids Code or Uniform Fire Code, as applicable.

3-1-1-7 All temporary supports must be removed prior to final backfilling.

3-1-2 Existing Facilities

3-1-2-1 If it is necessary to replace or interior-coat an underground steel tank which developed a corrosion induced leak, consideration should be given to interior coating or replacing all other steel tanks at the facility whether or not they are leaking. Replacement tanks should meet the requirements of 3-1-1-1 through 3-1-1-7. For underground steel tanks that are being interior coated and where the soil resistivity is less than 10,000 ohm-cm, it is recommended that the tanks be cathodically protected.

3-1-2-2 Unprotected steel tank replacement determinations should be based on specific site and soil conditions.

- 3-1-2-3 Tanks constructed of corrosion resistant materials, or cathodically protected steel tanks, or non-corrosive coated steel tanks need not be replaced based on arbitrary factors such as age alone.
- 3-1-2-4 Cathodic protection systems for steel tanks should be monitored sufficiently to insure continuous protection as prescribed by the designer and/or manufacturer.
- 3-1-2-5 Tanks to be abandoned or removed shall be handled in accordance with API Recommended Practice 1604.

3-2 Piping

3-2-1 New Facilities

- 3-2-1-1 All underground piping shall be either approved nonmetallic pipe or cathodically protected schedule 40 steel pipe. If a cathodic protection system is used, it shall be maintained in accordance with 4-2-2-5.
- 3-2-1-2 Product lines shall be installed in a single trench between the tank area and the pump island. Similarly, underground vent lines shall be installed in a single trench. If secondary containment is provided, all lines should slope towards the tank area.
- 3-2-1-3 Before underground piping is installed, the trench shall receive a minimum 6" deep bed of well compacted noncorrosive material such as clean, washed sand or gravel. All trenches shall be wide enough to permit at least 6" of noncorrosive backfill material around all lines.
- 3-2-1-4 All piping shall be tested to the requirements of 4-2-1-1.
- 3-2-1-5 All temporary supports must be removed prior to final backfilling.

3-2-2 Existing Facilities

- 3-2-2-1 Replacement of underground piping shall be in accordance with 3-2-1.
- 3-2-2-2 Repair of underground piping shall be in accordance with generally accepted industry practice.

3-3 Pumping Systems

3-3-1 New Facilities

- 3-3-1-1 Remote pumping systems shall be designed or equipped so that no part of the system will be subjected to pressures above its allowable working pressure.
- 3-3-1-2 All new remote pumping systems shall be equipped with a product line leak detector. Leak detectors shall be tested in accordance with 4-2-1-3.
- 3-3-1-3 For remote pumping systems, a listed rigidly anchored emergency shutoff valve, incorporating a fusible link or other thermally actuated device, designed to close automatically in event of severe impact or fire exposure shall be properly installed in the supply line at the base of each individual island-type dispenser. The automatic closing feature of this valve shall be checked at the time of initial installation and at least once a year thereafter by manually tripping the hold-open linkage.
- 3-3-1-4 Conventional suction systems may be used.
- 3-3-1-5 The operator shall immediately advise the owner should a leak detector signal a suspected product loss or a suction product system indicate a potential symptom of a leak (i.e. meter display jumping or skipping, liquid not being pumped when pump is on, initial pump overspeed followed by a slow pumping, erratic liquid flow indicating air and liquid mixture, continued loss of prime in the pumping unit, etc.) In no event shall the operator or his employees tamper with the leak detector.

3-3-1-6 The owner shall take immediate action to verify the operation of the pumping system when advised of a suspected leak by the operator. Should a loss be determined, the owner shall take immediate corrective action. The affected pumping system shall be taken out of service until the necessary corrective action has been taken.

3-3-2 Existing Facilities

3-3-2-1 It is recommended that existing remote pumping systems also be equipped with product line leak detectors. Leak detectors shall be tested in accordance with 4-2-2-6.

3-3-2-2 A listed rigidly anchored emergency shutoff valve, incorporating a fusible link or other thermally actuated device, designed to close automatically in event of severe impact or fire exposure shall be properly installed in a remote pumping system supply line at the base of each individual island-type dispenser. The automatic closing feature of this valve shall be checked at the time of initial installation and at least once a year thereafter by manually tripping the hold-open linkage.

3-3-2-3 The operator shall immediately advise the owner should a leak detector signal a suspected product loss or a suction product system indicate a potential symptom of a leak (i.e., meter display jumping or skipping, liquid not being pumped when pump is on, initial pump overspeed followed by slow pumping, erratic liquid flow indicating air and liquid mixture, continued loss of prime in the pumping unit, etc.). In no event shall the operator or his employees tamper with the leak detector.

3-3-2-4 The owner shall take immediate action to verify the operation of the pumping system when advised of a

suspected leak by the operator. Should a loss be determined, the owner shall take immediate corrective action. The affected pumping system shall be taken out of service until the necessary corrective action has been taken.

4. Detection

4-1 Inventory Control - New and Existing Underground Facilities

- 4-1-1 Accurate daily inventory records shall be maintained and reconciled on all flammable and combustible underground liquid storage tanks for indication of possible leakage from tanks or piping. The records shall be made available for inspection by the enforcing authority, and shall include as a minimum, records showing by product, daily reconciliation between sales, use, receipts, and inventory on hand. If there is more than one system consisting of a tank(s), serving pump(s) or dispenser(s) for any product, the reconciliation shall be maintained separately for each tank system.
- 4-1-2 Daily inventory shall be maintained for each tank system at each location by the operator. The inventory records shall be kept for a minimum of the past 12 months at the premises.
- 4-1-3 Inventory shall be based on the actual daily measurement and recording of tank product and water levels and the daily recording of actual sales, use, and receipts. Daily measurements shall be made by gauge, gauge stick, or by readout from an automated gauging system. The inventory records shall include a daily computation of gain or loss. The mere recording of pump meter readings and product delivery receipts shall not constitute adequate inventory records.
- 4-1-4 The operator of the location shall be responsible to notify the owner or person(s) in control of the facility to take action to correct any abnormal loss or gain not explainable by spillage, temperature variations or other causes.
- 4-1-5 Failure to maintain inventory procedures and records as indicated in 4-1-1 through 4-1-4 may result in penalties by the enforcing authorities.

- 4-1-6 As a minimum, the following steps shall be taken in an expeditious manner when daily inventory records indicate an abnormal loss:
- 4-1-6-1 The inventory records shall be checked for error.
 - 4-1-6-2 If no error is apparent, an independent calculation of apparent loss shall be made by a qualified person starting from a point in time where the records indicate a no loss condition.
 - 4-1-6-3 If Step 4-1-6-2 confirms an apparent loss, the readily accessible physical facilities on the premises shall be inspected carefully for evidence of leakage.
 - 4-1-6-4 If Step 4-1-6-3 does not disclose a leak, the dispensers used with the particular product involved with the apparent loss shall be checked for calibration. The drain plugs within the dispenser should be sealed by drilling holes in plug protrusion and inserting wire lead seals. Fill pipe openings should be locked to prevent unauthorized product removal.
 - 4-1-6-5 If Steps 4-1-6-1 through 4-1-6-4 do not explain the apparent loss and the regulatory reporting or testing requirements are not known, the situation shall be promptly reported to the authority having jurisdiction.
 - 4-1-6-6 If Steps 4-1-6-1 through 4-1-6-4 do not explain the loss, and if the piping system can be tested without the need for excavation, the piping system between the storage tank and dispenser(s) shall be tested in accordance with 4-2-1-1 for new facilities, or 4-2-2-4 for existing facilities. If it is necessary to excavate to perform a piping test, such a test shall be conducted after a storage tank test has been performed in accordance with 4-1-6-7.

4-1-6-7 If Step 4-1-6-6 does not disclose a leak, the storage tank(s) shall be tested for tightness in accordance with NFPA 329.

4-1-6-8 If Steps 4-1-6-1 through 4-1-6-7 do not confirm the apparent loss, the daily inventory shall be continued with a daily independent verification by a qualified person. Additional surveillance of the facility should be engaged to insure against unauthorized removal of product.

4-1-7 Daily inventories need not be maintained on those days that an installation is not in operation, but not to exceed fifteen (15) days.

4-2 Testing

4-2-1 New Facilities

4-2-1-1 All piping shall be installed according to the manufacturer's recommendations. Before being covered, enclosed or placed in use the piping shall be hydrostatically tested to 150 percent of the maximum anticipated pressure of the system, or pneumatically tested to 100 percent of the maximum anticipated pressure of the system, but not less than 50 pounds per square inch gage at the highest point of the system. If a pneumatic test is performed, all joints and connections shall be sprayed with a soap solution and the test shall be maintained for a sufficient time to complete visual inspection of all joints and connections, but for at least 10 minutes.

4-2-1-2 New underground tanks shall be tested for tightness hydrostatically or with air pressure at not less than 3 pounds per square inch and not more than 5 pounds per square inch after installation but before being covered or placed in use. Note - Air pressure tests shall not be conducted after petroleum product has been placed in the tank.

- 4-2-1-3 Product line leak detectors shall be tested for proper operation prior to use of the remote pumping system after initial installation.

4-2-2 Existing Facilities

- 4-2-2-1 The authority having jurisdiction may require the operator of an underground tank storage system to test the system for tightness, at the operator's expense, when accurate daily inventory records have not been maintained as specified in 4-1-2.
- 4-2-2-2 The authority having jurisdiction may require the owner of an underground tank storage system to test the system for tightness at the owner's expense when inventory records reveal an unexplained loss as specified in 4-1-4; or flammable or combustible liquids or their vapors have been detected in neighboring structures, sewers, wells, or another on or off property location.
- 4-2-2-3 Product tanks shall not be pressure tested with air.
- 4-2-2-4 Piping tests as required in 4-2-2-1 and 4-2-2-2 shall be by a pipeline test with liquid as specified in NFPA 329, "Underground Leakage of Flammable and Combustible Liquids".
- 4-2-2-5 If a cathodic protection system is installed, an ongoing preventive maintenance program shall be used. Where sacrificial anodes have been installed, their proper operation shall be confirmed by a qualified person within 6 to 12 months of installation and one year thereafter. If these tests confirm proper operation subsequent inspection intervals can be extended to 5 years. However, if underground work is performed at a protected site, cathodic protection should be remonitored 6 to 12 weeks after work completion and 1 year thereafter.

before again extending the inspection interval. If an impressed current cathodic protection system is installed, at least once a month, the operator shall verify that it is operating and at least once a year, a qualified person shall conduct an on-site test and inspection to measure the structure-to-soil and structure-to-structure potentials, and the rectifier voltage and current output.

- 4-2-2-6 Product line leak detectors shall be tested for proper operation on an annual basis.

4-3 Observation Wells

4-3-1 New Facilities

- 4-3-1-1 Observation wells of a minimum 2 inches in diameter are recommended to be installed within tank hole excavations at two corners when more than one tank is installed. If only one tank is installed, then an observation well should be installed near each end of the tank. Note: Observation wells should be identified to avoid confusion with product fill openings.
- 4-3-1-2 Observation wells shall be installed to a depth of 24 inches below the tank bottom or to the top of the concrete slab, if used for anchoring.
- 4-3-1-3 Observation wells shall be installed with a maximum 0.020 inches slotted pipe section with slots extending to within approximately 12 inches of grade. This will allow detection of product leaks on a fluctuating water table and will eliminate well plugging under most all soil conditions; blank well piping should extend the remainder of the distance to grade. It should be capped and protected from traffic with a manhole and cover.

- 4-3-1-4 With secondary containment, only one observation well is required. This well should extend to within approximately 6 inches from the bottom of containment material and have 0.020 inches slotted pipe to 24 inches above the designed water level within the containment system.

4-3-2 Existing Facilities

- 4-3-2-1 Observation well(s) should not be arbitrarily required for existing tank installations.
- 4-3-2-2 Observation well(s) may be required where inventory controls are not maintained as recommended and a local authority requires them due to a suspected tank failure/leakage.
- 4-3-2-3 Observation well(s) may be required where there is a high environmental risk due to the presence of sole source aquifers or water reservoirs.
- 4-3-2-4 Observation wells, when required, should be installed in accordance with 4-3-1-1 through 4-3-1-3.

4-4 Secondary Containment

4-4-1 New Facilities

- 4-4-1-1 Secondary containment is recommended for new installations when sole source aquifers are determined to need such protection or groundwater below the facility is within the cone of influence of municipal water wells. Where private potable water wells are within a minimum of 300 feet of a tank installation or hydrogeological conditions indicate that a potable water well could be contaminated by a tank leak, then secondary containment is recommended.
- 4-4-1-2 Secondary containment should be engineered for specific site conditions using the best current engineering practices and petroleum resistant materials.

4-4-1-3 Secondary containment for locations with water table elevations normally within the tank hole excavation should only require an impervious barrier on the tank excavation walls. The bottom should not be enclosed with the impervious barrier because the water table will allow detection of any petroleum product leak via the observation well.

4-4-1-4 Where the water table is below the tank hole excavation, secondary containment may be accomplished by lining the tank hole. The secondary containment should be constructed to maintain a water depth to the top of the tanks and then allow excess water buildup to be discharged from the bottom of the containment area via overflow piping or other similar system. Any leaking tank shall be readily detected by daily inventory control because the tank will be taking on water. Where feasible the overflow water should be allowed to discharge into the ground outside the containment area, to a dry well, to a storm drainage or sanitary sewer, as appropriate.

4-4-1-5 Secondary containment where required for new tank installations is recommended to be installed under all underground piping connected to the tank(s). The piping secondary containment shall provide for the collection and detection of any piping leak.

4-4-2 Existing Facilities

4-4-2-1 The technology for installing secondary containment for existing tanks, while they remain in-place, is not sufficiently reliable and effective to be recommended or required. As with new tanks, any secondary containment for existing tanks should be engineered for specific site conditions using the best current engineering practices and petroleum resistant lining materials.

Supplemental Comments of the American Petroleum Institute
on the
Regulation of Underground Storage Tanks

March 23, 1984

The American Petroleum Institute (API) is pleased to submit the following comments as a supplement to the March 1, 1984 testimony of William O'Keefe before the Committee on Environment and Public Works of the United States Senate. The comments are limited to a review of Amendment No. 2758, as printed in the Congressional Record of February 29, 1984.

As a matter of general policy, API believes that state and local governments are in the best position to establish reasonable and effective regulations for underground storage tanks. The risk and consequences of tank leaks vary from one area to another, thus making localized response the best solution. If, however, the federal government does become involved, API strongly urges that regulation take the form of performance standards, so that some degree of flexibility can be maintained.

Overall, the language of the amendment suffers from a lack of clarity, and many of our comments are directed at that weakness. The major substantive differences that API wishes to express are:

- . The definition of petroleum, natural gas liquids and gas liquids as "hazardous substances" is unnecessary to accomplish the objectives of the amendment.
- . The exemption of certain underground tanks because of size or use is not warranted on environmental grounds.
- . API opposes the extension of liability to refiners or suppliers for leaks of non-waste materials from underground storage tanks owned or operated by other persons. (See comments on section 1456).

Comments on specific sections of the amendment follow.

Section 1451 -- Definitions

(1) "Hazardous substance"

Petroleum, natural gas liquids and gas liquids should not be specifically designated as hazardous substances in the amendment. If specific action on storage tanks for petroleum, natural gas liquids, and gas liquids is desired, the legislation can accomplish that objective without the "hazardous" designation.

A particular problem of this definition concerns whether used motor oil would be covered here if proposed section 27 of H.R. 2867, as passed by the House of Representatives, were enacted. It is not clear how the two provisions would fit together logically.

(2) "Owner or operator"

The terms "owner" and "operator" are used repeatedly throughout the amendment, as many obligations are imposed on each. The legal relationships governing responsibility for tanks are complex, and without clarification it would be difficult to understand and apportion responsibilities under this amendment. The terms "owner" and "operator" should be clearly and separately defined and the proposed duties of each should be delineated.

(3) "Release"

The scope of "release" is too broad. As drafted, it might be read as including gaseous releases from piping or tank filling, or minor surface spills at self-service gasoline stations. Such breadth would make the reporting requirements under sections 1452(a) and 1453(a)(3) quite onerous, and thus confound enforcement activities.

(4) "Underground storage tank"

A serious difficulty exists with the definition of underground tanks. As written it would cover not only underground tanks, but also above-ground tanks with structural supports partially imbedded in the ground, or with an earthen bulwark around them. As such, it seems beyond the intent of this amendment. A suggested definition for underground tanks can be found in the API Recommended Practice for Underground Petroleum Product Storage Systems At Marketing and Distribution Facilities (Section 2-1).

A major concern of API is the exclusion of farm and residential underground tanks of less than 1,100 gallon capacity, and underground tanks used for heating oil for consumption on the premises where stored. The likelihood of a leak has not been correlated with either the size or use of the underground tank and, therefore, there is no environmental justification for any exclusion. In fact, the real market incentives for self-discipline are much weaker for the classes of tanks which the amendment would exclude than they are for those proposed to be regulated.

Section 1452 -- Preliminary Notification

This section is confusing and would create an unnecessary administrative quagmire. The allocation of responsibilities among different governmental units is unclear, and the time allowed for them to develop a notification system is inadequate. It is not clear how EPA or the states will give adequate notice to all tank owners and operators who will be covered by the program.

Subsection (b) requires reporting of prior underground tank abandonment. It assumes the existence of records on tank abandonment which may not exist. The requirement should contain a cut-off date before which abandonment is not reportable. Otherwise, corporations will be exposed to potential liabilities for events which are not reasonably within their knowledge.

Subsection (e) is unclear as to whether it is intended to be a criminal or a civil penalty provision, since it contains elements of each. This also pertains to subsection 1453(b) and (c).

Section 1453 -- Release, Prevention and Correction Regulations

API does not believe that the detailed content of the regulatory scheme described under section 1453(a) is appropriate. Protection of groundwater from tank leaks is a complicated problem, and the best course of action will vary greatly with local conditions. The amendment would not only preclude the exercise of discretion at the state and local levels, where it properly belongs, but also deprive EPA of any discretion to tailor its program to local conditions. It seems inconsistent for the amendment to carefully provide that the Administrator must consult with state and local officials and the public to determine the best solution to a problem, and then go on to specify the components of the regulatory scheme.

The time limits are inappropriate and unrealistic. Twelve months is simply not enough time to develop this regulatory program. Time limits in other environmental programs have usually led to grief for both the agencies and the regulated community.

It is uncertain what criteria the Administrator would apply in determining whether registration renewal is "necessary."

It is not clear what periodic tanks inspection means. Physical inspection of underground tanks is not practical for

most standard gasoline storage tanks. Periodic tank tightness testing is not a practicable solution either. It is an expensive procedure that provides assurance only that the tank is not leaking at the time of the test. It provides no information on the overall condition of the tank. Continuous inventory control is the best available method for assuring the integrity of existing underground storage systems.

The scope of coverage of subsection (c) is unclear. If the provision is intended to mean that no one should put a substance into a tank that has not received a certificate, it should be so stated.

Section 1454 -- New Tanks

The requirements for new underground storage tanks are for the most part consistent with API's views, as embodied in its Recommended Practices. The exception is the requirement that all tanks be equipped with leak detection devices. The reliability of leak detection technology for underground tanks has not been satisfactorily demonstrated.

Section 1455 -- Inspections

Subsection (a)(2) mentions that inspection may include sampling of substances. It is not clear how this contributes to the stated goals of the legislation.

Subsection (b) requires that all records of information obtained be available to the public. The access provision is quite broad, since it would include everything related to a tank. It is probable that such records will on occasion include sensitive competitive information. API believes that existing statutes on public access to confidential information should be used to narrow the scope of access.

Section 1456 -- Response to Releases

This section would, in essence, extend the liability provisions of CERCLA to the clean up of any release of a petroleum product from underground tanks. Recent court decisions on CERCLA suggest that petroleum marketers and refiners could, as a consequence of this extension, be held liable for response costs due to tank leaks from exempted tanks and non-retail facilities even when the marketers or refiners had no knowledge about the condition of the tank or were actively misled.

Such an extension of liability violates basic principles of equity. It would also create a perverse set of incentives, since it would remove pressure on non-industry tank owners to maintain the integrity of their systems. Those responsible for damage caused by leaks should bear the financial burden for mitigating the effects of that damage.

Section 1457 -- Approval of State Programs

API firmly supports the position that groundwater management ought to be in the hands of state and local governments.

In reading subsection 1457(2) however, it is unclear what the amendment intends with respect to some of the state enforcement responsibilities. It would seem that it is limited to control of tanks, as specified in subsection 1453(a), and that any action with respect to a release would remain with the EPA. This requires clarification.

Section 1458 -- Federal Facilities

API strongly supports this provision. No regulatory system can protect groundwater adequately unless it includes all underground tanks, including those owned and operated by the Federal government.

Section 1459 -- Study

As stated above, API does not believe exemptions are appropriate for any class of underground tanks. The need to study the impact of the tanks exempted by the amendment is neither more nor less than the overall need to develop better information on this problem before proceeding with Congressional action.

EXXON COMPANY, U.S.A.

POST OFFICE BOX 2180 • HOUSTON, TEXAS 77252-2180

MARKETING DEPARTMENT

R. P. LARKIN
VICE PRESIDENT

March 30, 1984

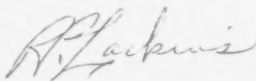
The Honorable Robert T. Stafford
Chairman, Committee on Environment and Public Works
United States Senate
SD-410 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Senator Stafford:

The attached statement from Exxon Company, U.S.A. on the potential threat to groundwater from leaking underground storage tanks is respectfully submitted for inclusion in the record of the March 1 hearing, chaired by Senator Durenberger.

While our views on this subject are generally reflected in the testimony given by the American Petroleum Institute, we wanted to provide for the record a description of Exxon's underground leak prevention and detection programs. We hope this submission will be helpful to the committee's understanding of what is being done on a voluntary basis to protect groundwater from potential contamination from underground petroleum product storage systems.

Sincerely,



RPL:hg
Attachment

c - w/attachment:
Senator David F. Durenberger

WRITTEN SUBMISSION
BY
EXXON COMPANY, U.S.A.
TO THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
ON THE
POTENTIAL THREAT TO GROUNDWATER
FROM
LEAKING UNDERGROUND PETROLEUM PRODUCT STORAGE TANKS

Exxon Company, U.S.A. appreciates the opportunity to submit for the March 1 hearing record comments on the potential threat to groundwater from leaking underground petroleum product storage tanks.

One of the main objectives of this submission is to make available to the Committee information on Exxon's underground tank leak prevention and detection programs. To assist with understanding the technical aspects of that discussion, certain background information is provided in the Attachment.

EXXON LEAK PREVENTION AND DETECTION PROGRAMS

Exxon Company, U.S.A. has a genuine concern for the potential of groundwater contamination from underground petroleum product storage leaks. For over twenty years, Exxon has followed leak prevention and detection procedures designed to maintain the integrity of its underground storage systems. The objective of these programs is the prevention of product loss and groundwater contamination from leaks either through upgrading underground systems or by careful monitoring to detect leaks when they occur. In recognition of the finite life of tankage systems, Exxon initiated comprehensive tank leak prevention and detection programs in 1980.

LEAK PREVENTION

The 1980 Exxon leak prevention program includes one or more of the following procedures to upgrade a tank field.

- o Tightness testing of certain tanks and lines where age and soil conditions indicate a test is necessary.
- o Installation of cathodic protection systems where soil and steel tank/piping conditions warrant use of this technology.
- o Lining the interior of existing steel tanks and replacing the piping with noncorrosive materials when the tank inspection meets Exxon structural criteria.

- o Replacing tanks and lines with noncorrosive materials at a predetermined age related to soil conditions or when other circumstances indicate the tankage is approaching the end of its useful life.

Exxon presently owns tankage at about 7000 service stations. Of that number, the systematic tank upgrading program has resulted in cathodic protection systems installed at 2,300 locations, noncorrosive tank and piping systems installed at over 1,700 locations, and interior lining completed for about 500 tankage systems. That upgrading cost over \$100 million. Exxon will spend another \$70 million to complete the program by 1986.

LEAK DETECTION

Along with its 1980 leak prevention program, Exxon stepped up its leak detection efforts. The leak detection program focuses on product inventory data reconciliation at the individual facility as the key to prompt discovery of an underground leak. Exxon encourages operators to reconcile sales with inventory levels on a daily basis. Exxon also provides training in proper inventory reconciliation procedures, and has produced audio-visual cassettes which are used as basic training aids. In addition, an in-house brochure and various American Petroleum Institute publications are widely distributed to operators to help communicate leak detection procedures. Finally, the Exxon program requires the company sales representative and the facility operator at locations directly served by Exxon to perform jointly an annual product inventory reconciliation which covers a thirty-day period. A more detailed explanation of the product inventory data reconciliation procedure appears in the Attachment.

This leak detection program has been instrumental in making Exxon facility operators more aware of the preferred method and the need to find and report leaks as soon as possible. Early detection is extremely important as it allows corrective action to be taken before a possible groundwater contamination problem occurs. As soon as leaks are detected, Exxon takes prompt action to prevent such leaks from either reaching the groundwater or to clean up rapidly any contamination that may have occurred.

EXXON VIEWS ON FEDERAL LEGISLATION

Exxon's views on possible federal legislation to control leaks from underground petroleum product storage tanks are generally reflected in the prepared statement of William O'Keefe of the American Petroleum Institute delivered at the Committee hearing on March 1, 1984. The Exxon leak prevention and detection programs described herein support the point made by Mr. O'Keefe that API member companies are sensitive about groundwater contamination from tank leaks, and are taking substantive steps to reduce the threat.

Exxon believes that additional federal legislation concerning leaks from underground petroleum product storage tankage is not necessary. Existing federal and state laws and regulations are currently adequate to address the problem. Moreover, the weight of evidence indicates that the major threat to groundwater comes from septic tanks, industrial wastes, chemicals, and municipal landfills.

State governments should continue to have primary authority and responsibility for groundwater management because the characteristics of groundwater and its use patterns vary significantly across the nation. Exxon continues to support those state programs that emphasize the use of daily inventory control and reconciliation as opposed to mandatory equipment installation and procedures--such as constant monitoring leak detectors and periodic testing--which are either not justified or are not effective.

Exxon does not support legislative proposals that would attempt to spread the cost of leak cleanup among all underground tank owners. The cost of cleaning up contamination caused by a leak should be borne by the owner of the tankage involved. In this connection, owners who can demonstrate the financial ability to cover potential liability should have the option to self-insure. Those unable to meet such financial criteria may be required to carry liability insurance. Several states have contamination liability insurance programs available.

3/30/84

ATTACHMENT TO WRITTEN SUBMISSION
BY EXXON COMPANY, U.S.A.
TO SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
ON UNDERGROUND PETROLEUM PRODUCT STORAGE TANKS

BACKGROUND

FACTORS CONTRIBUTING TO UNDERGROUND LEAKS

Underground product leaks occur as a result of mechanical or corrosion failures in storage tank systems. Mechanical failures occur infrequently and are normally due to faulty installations. Thus, the primary cause of leaks in steel underground storage systems is corrosion. Understanding what corrosion is and how it works is basic to designing methods to prevent corrosion failures. Simply stated, corrosion is the deterioration of a material through an electrochemical reaction between the material and its environment with chemical change at the material's surface accompanied by the transfer of electrical energy.

While the corrosion process can be explained, the question of why a metal will corrode at different rates in different situations is more complex. Basically, the rate of corrosion is directly related to the magnitude of the electrical current flow in the corrosion cell. The effective resistance of most corrosion cells is provided by the electrolyte. Since moist soil is the electrolyte in an underground corrosion situation, variations in soil characteristics greatly influence the soil's ability to carry current, and in turn, a structure's tendency to deteriorate. The primary factors inherent in the soil that affect the corrosion process are resistivity, acidity, moisture, and bacteria.

LEAK PREVENTION TECHNOLOGY

The two basic materials currently being used for underground tanks and piping are steel and fiberglass reinforced plastic. Since fiberglass tanks and piping were first used in the early 1970's and did not become prevalent until about 1976, the majority of existing underground storage tankage is currently of steel construction.

The following three basic methods are used to minimize corrosion failure of underground storage systems.

- o Cathodic protection
- o Interior and exterior coatings
- o Non-corrosive materials

Cathodic protection is an effective method for preventing further corrosion of existing underground steel. Cathodic systems operate on the principle of superimposing an electrical current on the underground structure so the tankage is transformed into the cathode of the cell; i.e., it receives current from the soil rather than discharging to the soil.

Interior and exterior tank coating systems are also used as a means to prevent corrosion of steel tanks. When properly installed in a structurally sound tank, interior lining provides a practical and dependable method of extending existing steel tank life. From an economic viewpoint, interior lining is frequently the most cost-effective solution. Failures can generally be traced to the use of improper materials, application procedures or, in the case of interior coatings, to existing tanks that were so structurally deficient that the lining should not have been attempted.

Non-corrosive materials, such as fiberglass reinforced plastic, may be used to fabricate tanks, piping and fittings. The use of such inert materials provides a means of eliminating corrosion failures and can be economically attractive when compared to other methods for controlling corrosion of steel tanks and piping. The selection of system types has to be made on an individual basis to fit individual circumstances, and special procedures are necessary to avoid damaging non-corrosive tanks during installation.

LEAK DETECTION METHODS

Leak detection methods may be separated into two categories as follows:

- o Tank and line tightness testing
- o Continuous leak monitoring

Tank and line tightness testing involves measuring liquid gain or loss over time. The National Fire Protection Association (NFPA) requires that such a test be capable of detecting leaks as small as 0.05 gallons per hour. While the basic principle involves the measurement of the amount of liquid lost or gained in a certain period of time, a net liquid volume change must be calculated because of variables such as petroleum product temperature changes, petroleum product stratification, and tank end deflection due to pressure changes. Tightness testing of underground tankage on a one-time basis can be effective to identify existing leakers, but this periodic form of testing will only by coincidence detect a leak at the time it occurs.

Continuous leak monitoring is the second category of leak detection methods commonly used and includes:

- o Line leak detectors
- o Observation wells
- o Inventory control

Line leak detectors are used to monitor underground piping continuously at retail petroleum marketing facilities. NFPA 30, Flammable and Combustible Liquid Code, requires a leak detection device to be installed on dispensers of pumping systems which will provide an indication if the piping and dispensers are not essentially liquid tight. Pressure-sensing diaphragm-operated valves, designed to indicate a leak in the piping between the leak detector and above-ground dispenser, are currently available that will satisfy this NFPA 30 code requirement.

Observation wells may be drilled in the ground near tanks or piping. Typical observation wells are 1½ to 2 inches in diameter, lined with perforated plastic pipe and placed at a point 2 or 3 feet below the tank bottom. The surface end of the pipe is located in a covered manhole in a manner similar to fill pipes. Testing for a leak is accomplished by checking the well bottom for evidence of free product.

Automatic liquid detection wells are a modification of observation wells. A liquid sensing cable or another hydrocarbon indicator is installed in bored holes to signal when petroleum reaches the boring.

Inventory control and reconciliation procedures are probably the best and most cost-effective system available for detection of underground leaks. The American Petroleum Institute, National Fire Protection Association, Occupational Safety and Health Administration, and several states recommend and require inventory control as a means of early leak detection. Historically, operators of underground tankage have been encouraged to reconcile sales and physical inventories as a sound business practice and to detect any unusual losses.

The first step in inventory verification is to provide counseling and training for the facility operator on the importance of good record keeping as well as to teach proper control procedures and techniques.

Inventory reconciliation is performed by comparing pump meter and underground tank gauge measurements. By reconciling these readings at the end of each business day, the operator can readily identify patterns of abnormal inventory variations and initiate follow-up procedures to determine if the potential for a leak exists.

When inventory reconciliation reveals a variation of more than 0.5% between the total metered sales and physical tank inventory measurements, the following steps should be taken to determine the cause. First, review operating procedures and the physical condition of the equipment. If this does not isolate the cause of the variation, the second step is to check the calibration of the pump meters.

Only licensed weights and measures technicians should perform a re-calibration, but preliminary testing procedures can be done by others to get a reasonably accurate determination. If such testing shows the meters are improperly calibrated, the previously identified inventory variation must be adjusted. If, after adjustment, the inventory variation is still in excess of 0.5%, the final step is to test the tanks and piping for tightness. Of course, if any part of the underground system is determined to be leaking, immediate corrective action should be taken.

Statement presented to the Groundwater Contamination and Underground Storage Tanks Hearing of the Senate Environment and Public Works Committee by James H. Pim, P.E., Associate Public Health Engineer; Supervisor, Hazardous Materials Management Section, Suffolk County Department of Health Services, 15 Horseblock Place, Farmingville, New York 11738; March 1, 1984.

COUNTY OF SUFFOLK



PETER F. COHALAN
SUFFOLK COUNTY EXECUTIVE

DEPARTMENT OF HEALTH SERVICES

DAVID HARRIS, M.D., M.P.H.
COMMISSIONER

The Relationships of the Suffolk County, New York Experience to a National Toxic and Hazardous Materials Control Law

Suffolk County, New York has had a strong program of hazardous materials storage and handling control since January 1980, when Article 12 of the Suffolk County Sanitary Code went into effect. The code was passed by the local board of health after several years of preparation in response to a steadily increasing rise in the number of reports of public and private well contamination, leaks, spills, fires and accidents involving chemicals and petroleum products.

The groundwater which supplies the 1.3 million people of the county with their daily needs, derives solely from precipitation which falls directly on the island and soaks quickly into the porous sandy soil. It is especially susceptible to contamination from any foreign material which is deposited on or into the ground.

As detection capability has improved, more and more chemicals have been found in Suffolk County groundwater. The list now includes the following compounds:

Chloroform	1,3,5 Trimethylbenzene
Bromoform	1,2,4 Trimethylbenzene
Chlorodibromomethane	1,1 Dichloroethane
Bromodichloromethane	Diethyl Phthalate
1,1,1 Trichloroethane	Dichlorobenzene
1,1,2 Trichloroethane	1,1 Dichloropropane
1,1,2 Trichloroethylene	Bromobenzene
Tetrachloroethylene	Chlorotoluene
Freon 113	Chlorobenzene
Carbon tetrachloride	Benzene
Methylene Chloride	Vinyl Chloride
Toluene	1,1 Dichloroethylene
Xylene	Cis 1,2 Dichloroethylene
Ethylbenzene	1,2 Dichloroethane
1,1 Dichloroethane	1,2,3 Trichloropropane
	2 Bromo-1-Chloropropane

A total of 678 private and public water supply wells have been contaminated with chemicals other than pesticides. Over 2,200 have been contaminated with pesticides.

Petroleum spill incidents since 1978 have totaled over 1,500. There are 18 recovery operations in place at the present time removing gasoline or fuel oil from the surface of the groundwater.

These statistics seem to indicate that Suffolk County has exceptional problems with groundwater quality, but in fact the reverse is true. The groundwater quality of the county is still generally excellent. What the statistics are actually indicating are the results of a very strong and complex program of local environmental investigation and management which is aimed at preserving and protecting the groundwater quality for all time.

Suffolk County, under the direction of County Executive Peter Cohalan, has been carrying out a bold groundwater management program which started years ago with the vigorous enforcement of the State Pollutant Discharge Elimination System Permit Program. This was followed by a detergent ban and a cesspool additive ban. Article 12 then followed to control the storage and handling of toxic and hazardous materials. Finally, the most recent proposal has been introduced: Article 7 of the Sanitary Code, which is an attempt to regulate the location of activities that require the use of toxic and hazardous materials.

Research has disclosed that the central part of Long Island is the area most critical for groundwater protection. In this area precipitation penetrates deeply in a near vertical direction down to the lowest areas of the aquifer where the major water supplies are located. Water entering the ground in this region takes hundreds of years to finally reach the sea moving at about one foot per day.

The decision has been made first at the county level and now at the state level as well, that the only way to permanently protect the groundwater reservoir of Long Island is to provide extraordinary protection to these deep recharge areas by treating them like the drainage basins surrounding surface water reservoir. That is, by completely excluding from the critical areas activities which use or store toxic or hazardous materials.

Though this is normal practice for surface impoundments, it seems to be a revolutionary concept in this country when applied to groundwater recharge areas because it infringes on the zoning rights of local authority. In Europe, however, it is a control approach which is being addressed.

Suffolk County is not unique. Rather it is a microcosm of innumerable areas throughout the nation wherever a significant groundwater aquifer exists, available for present or future water supply.

Suffolk is different only in that more money has been spent on groundwater research and analysis than most places, and a vigorous program of control has been developed. The problems are no worse in Suffolk than most other places, they have just been discovered earlier.

Most areas of the United States do not have the means of investigating and protecting groundwater at the local level the way Suffolk County does and most aquifers are not confined within one political jurisdiction. It is therefore essential that protection be provided at the national level with the provision that authority may be passed to the state or local level where appropriate. The Resource Conservation and Recovery Act is a reasonable vehicle for creating required legislation, but because of the complexity of the matter, a separate groundwater law might be more manageable.

Regardless of how it is organized any program should go far beyond just a simple tank law. Tremendous sums of money will be required to upgrade storage facilities and the nation cannot afford to spend it inefficiently. On the other hand, neither can the nation afford to allow the groundwater resources to be contaminated. The most sensible approach to the problem is to provide varying degrees of control over the storage and handling of toxic and hazardous materials depending on the threat the area poses to groundwater quality.

The nation's aquifers should be accurately mapped and their critical recharge areas defined. Zones of protection should be established taking into consideration the characteristics of each aquifer. The highest level of control should be over the main recharge area of each aquifer and surrounding well fields. This should involve the complete exclusion of the use of materials within the zone which could contaminate the aquifer. Industries using chemicals should not be allowed to locate there.

A second level of protection could apply to most other areas of the country where groundwater is present. In these zones any activity would be allowed, but toxic materials would have to be stored in high quality containers and existing facilities would have to be upgraded. Probably the double-walled containment philosophy would apply and control would be similar to that provided in Suffolk County by Article 12 of the Suffolk County Sanitary Code.

Finally there should be a third zone category where storage of toxic materials poses only minimal threat to ground or surface waters and extraordinary controls are not necessary. Here existing facilities could continue to be used as long as they remain sound and standard single-walled construction could be used for new facilities as long as they were built safely and protected against corrosion.

A program of this type is far-reaching and practical. It puts limited resources where they can do the most good and provides a permanent solution to a rapidly growing national problem. It addresses all types of toxic and hazardous materials and all types of storage and handling. Money that is spent is in the form of capital improvements. Risks, and therefore liabilities, are reduced and operating conditions are improved. Authority for enforcement can be passed to the states as with other pollution control laws. Fees can be collected to support the program through a tank registration

requirement. The services of the Geological Survey will need to be enlisted to map the aquifers.

Of course a plan of this type will present major difficulties where development already exists over recharge zones and in those areas compromises will have to be worked out on an individual basis. These compromises may range all the way from a program of phasing out all non-compatible uses to the other extreme of writing off certain portions of an aquifer as being too contaminated already and not worth reclaiming.

Anything short of a complete program of this type on a national basis will be inadequate and doomed to failure. European experience should be studied carefully since this subject has been under serious consideration there for nearly twenty years.

A Brief Explanation of Article 12 of the Suffolk County Sanitary Code

Article 12 of the Suffolk County Sanitary Code is a law passed by the County Board of Health under their authority which derives from the New York State Health Law. It is administered by the Suffolk County Department of Health Services under the direction of Commissioner David Harris, M.D., M.P.H. It provides standards of construction and operation for all types of facilities for the storage and handling of toxic and hazardous materials. The definition of such materials is very broad based and includes nearly everything that could contaminate groundwater.

In preparing the law several years ago, no models could be found in this country to follow since no one else had adequately addressed the problem. Subsequent investigation of European practice disclosed that many very strict laws were in effect and had been for several years but great difficulty was experienced in obtaining copies and translations. Article 12 was therefore developed using common sense and the best information available.

A basic concept of double-walled containment was applied throughout the law as being the most practical way of obtaining maximum protection. Then as a matter of compromise, one major exception to that philosophy was allowed for underground petroleum storage where single-walled tanks were permitted if made of non-corrodible materials and if provided with leak detection and overfill protection devices.

The law covers above and below ground tanks, indoor tanks, portable container storage, transfer facilities and pipelines. Transportation is not covered since it is the jurisdiction of State and Federal Departments of Transportation and not easily controlled by a local jurisdiction.

All tanks are registered and computerized and a small registration fee collected. About 6500 tanks have been registered so far. All plans for construction are reviewed and approved by the Health Department and a small plan review fee charged. About 1700 new tanks and other facilities have been constructed so far to meet the code.

The law requires that all new construction meet the code standards and that all existing facilities be upgraded by 1987 for chemicals and 1995 for petroleum. This means the replacement of nearly all underground tanks and major improvement to all other facilities.

During the interim period before replacement, all tanks must be tested periodically, using an approved method, by testers licensed by the County Health Department. The testing frequency varies from two to five years depending on age of the tanks. About 2400 tanks have been tested so far with an average leakage rate of about 7%. The leakage rate including the associated piping systems is about 22%.

Abandoned tanks must be filled in with soil or removed.

For underground petroleum storage, fiberglass, fiberglass coated steel, or cathodically protected steel tanks are allowed.

For double walled installations, factory manufactured double-walled tanks are used or single-walled tanks installed in concrete vaults. Double-walled tanks have been manufactured in Europe for many years and are available on the American market. Double-walled tanks are also just now beginning to appear from American manufacturers to meet the new code requirements. A leak detection system is required between the walls and various systems of vacuum, pressure or level detection are available.

Piping systems must also be double-walled or laid in utility galleries except for petroleum products where non-corrodible single-walled construction is allowed.

Above ground tanks must be built within an impervious, diked enclosure so that no ground penetration of spilled product can occur.

Existing terminal tanks must have interior bottom plates sandblasted and coated with an approved epoxy or other coating system and reinspected every seven years.

Drums must be stored in approved facilities with impervious dikes and floors and protected from the weather.

Bulk stored dry chemicals that could leach if exposed to precipitation or fire fighting water must also be adequately protected.

Enforcement of the code is by the very efficient use of compliance conferences and consent orders followed if necessary by formal administrative hearings and commissioners orders. On rare occasions when circumstances warrant it, cases are referred to the district attorney's office for criminal prosecution. To date, 367 cases have been processed with a total of over \$125,000 in penalties assessed and nearly \$300,000 in penalties suspended for satisfactory completion of remedial action.

In summary, the Article 12 program has been an exceptionally successful effort with efficient enforcement and minimal commitment of additional resources. In fact, the program was successfully initiated with no additional personnel, though it now has grown to where several new positions are needed. The law has proven to be a useful model for several other jurisdictions around the country where action to control groundwater contamination problems is rapidly increasing.

STATEMENT OF WILLIAM S. BURGESS

WATER RESOURCES ADMINISTRATION
MARYLAND DEPARTMENT OF NATURAL RESOURCES

HEARING ON GROUNDWATER CONTAMINATION & UNDERGROUND STORAGE TANKS

SENATE COMMITTEE ON THE ENVIRONMENT AND PUBLIC WORKS

March 1, 1984

I would like to thank the Senate Committee on the Environment and Public Works for the opportunity to express both my views as well as those of the State of Maryland with reference to the problem of underground oil spills. Although the committee is investigating underground storage tanks containing hazardous materials as well as petroleum products, I will limit my testimony to the storage of petroleum products which is within my particular area of expertise. I am the Chief of the Spill Response Team for the Maryland Department of Natural Resources. This job requires my overseeing the field response activities for oil spills as well as preparing contingency plans for the State of Maryland and drafting regulations for the prevention of oil spills.

SCOPE OF THE PROBLEM

The underground spill problem is nothing new to those of us who have handled oil spills in the past. I have been with the Maryland Department of Natural Resources since 1975 at which time the first spill I responded to was from an underground gasoline tank. Since that time however, the frequency of reported underground spills and the severity of the problems encountered has increased dramatically to the point where they occupy most of my time as well as many other personnel of our Administration. To demonstrate the increasing nature of this problem, I offer the following statistics on underground spills for which the Water Resources Administration has actively been involved in the investigation for the source of the spill or in recovery operations *1:

Fiscal Year 1980	-	38
Fiscal Year 1981	-	41
Fiscal Year 1982	-	31
Fiscal Year 1983	-	77
Fiscal Year 1984 (to date)	-	over 67 *2

The recent increase can be attributed to a number of factors. Most importantly, there is a better awareness that such problems must be reported. This is in part due to our Administrations effort to inform industry members through a series of workshops and meetings which we have sponsored. It is perhaps further due to the fact that our Administration is currently filing criminal charges in District Court of Maryland against one major oil

company representative for failure to report an underground leak. We are considering filing charges against another major oil company representative for the same violation. Our message is clear, we will not tolerate the failure to report these problems from any source or type of facility including government installations, when the problem has been identified by representatives of that facility. We know that many of these problems are handled by local jurisdictions including fire and health departments, without our knowledge or involvement. This trend however, is rapidly declining, because most agencies do not want to become deeply involved in problems which require so much expenditure of manpower to properly mitigate and are at the same time so legally and technically complex, controversial, and emotional. Our Administration has a legal mandate to respond to such problems and has developed a reasonable amount of talent for handling them. Therefore, most other agencies in the State are more than willing to refer these problems to the Water Resources Administration.

Most often one will hear that this problem is the result of increased prosperity in the 1950's and early 1960's. The theories simply stated are that increased automobile ownership required increased construction of service stations during this time period. The average life of plain steel storage tanks, due to uniform and pitting corrosion, is somewhere in the neighborhood of 12 to 20 years, (depending on what source you use). We are therefore, experiencing one of the worst effects of our Nation's prosperity. This theory certainly has merit and explains in part why we are faced with so many leaking tanks when we do have the technology to prevent such problems. Unfortunately, today we are faced with many other reasons for underground spills. Shamefully, we have manufacturers who provide equipment for underground installations (galvanized malleable iron pipe fittings) with reported failure rates as high as 80% *3. Equally dissapointing is the fact that many installation companies do not have the required knowledge to install underground storage systems or even worse, ignore the installation standards issued by the manufacturers of underground storage tanks and piping *4. Generally, we can always attribute underground spills to one of the following problems:

CORROSION
STRUCTURAL FAILURE
IMPROPER INSTALLATION
CHEMICAL INCOMPATIBILITIES WITH PRODUCT BEING STORED

The last cause above will become an increasingly important factor in years to come. As our Nation searches for alternative sources of energy and fuels, we look towards the alcohol products. Specifically, Methanol is the most likely alternative fuel for the automobile. In fact, it is currently being blended in small

percentages with gasoline accross the Nation while some test fleets are burning neat methanol (100%). The problem comes when the materials used to manufacture tanks, piping, gaskets, hoses and other related handling equipment, are not compatible with methanol. This is a hotly contested issue with the equipment manufacturing firms as well as the industry at large. For the purposes of my testimony today, it is better left alone, except to say that this issue may require a "long and hard look" in the near future.

Additionally, improper maintenance and the absence of an inventory control system will aggravate the problem by not allowing for the early detection of an underground spill.

I also have an obligation to tell you that every facility which stores petroleum products underground is a risk to the environment. Most often, the service station is identified with the underground spill problem because the loss of gasoline normally will create a more immediate hazard. Liquid gasoline in a well or vapors entering a home may create a potentially explosive atmosphere. Evacuations sometimes occur and there will certainly be more attention required by the fire department with gasoline than with fuel oil. There has been one documented incident of a death due to an underground leak in Maryland. It occurred when an individual, who obtained his water from a domestic well, was draining the water holding tank in his basement and gasoline came out, traveled accross the floor and ignited when the sump pump turned on.

Examples of facilities with which we have had repeated problems are:

- a. Schools
- b. Churches
- c. Private Homes
- d. Service Stations
- e. Office Buildings
- f. Apartment Buildings
- g. Government Installations
- h. Small Business Facilities with gasoline or heating oil storage

HOW IS MARYLAND ADDRESSING THE UNDERGROUND SPILL PROBLEM?

For the past two years, personnel of the Administration have been involved in rewriting COMAR 08.05.04.07 Prevention of Oil Pollution, (See Attachment 3). These are the State Regulations which govern the storage, transportation and handling of oil in Maryland. From the begining, the emphasis has been on the

addition of regulations which will prevent underground oil spills. The Administration attempted to do essentially the same thing in 1978. At that time however, we did not have enough data on the numbers and effects of underground spills, and the public support was not strong enough to overcome industry objections to certain provisions of the then proposed regulations. In 1978 the major concern was a provision for mandatory testing of underground storage systems.

Since that time, the Administration has implemented a computerized spill reporting system with annual reports as well as maintenance of case files on underground leaks with particular emphasis on the factors considered important to preventing underground spills. Using the data from these sources, the Administration has successfully defended its position that new regulatory action is essential to preventing and dealing with underground spills.

Nearly everyone who is familiar with underground spills will expound on the right way to prevent them. You can see the different approaches in various regulations which have been promulgated across the Nation. The one underlying theme that appears in all regulations which I have reviewed, is emphasis on installation of corrosion resistant tank systems. Beyond that one point, most regulations vary widely in their approach and other preventative measures.

Maryland's proposed regulations are scheduled to be published in the Maryland Register during late March for the first time. If nothing unusual occurs during the public comment period, they should be adopted in final form during late May. The major provisions concerning the prevention of underground leaks are as follows:

- a. Specifications for the types of storage systems which will be acceptable to the State. Unlike many jurisdictions, Maryland is requiring all piping to be non-corrosive in addition to the tanks.
- b. Requirements have been established for testing new storage systems to insure that they have been installed properly.
- c. All storage systems installed prior to the effective date of the regulations which do not meet the installation standards, will have to begin a schedule of mandatory testing once they reach an age of 15 years.
- d. A permanent monitoring well will have to be installed with all new storage systems.
- e. Bulk inventory control will be required at underground

storage facilities.

f. Procedures have been established for owners and operators of underground storage facilities to follow in the event of an actual or suspected leak.

g. Color coding or clear tank identification by means of tagging will be required at all underground storage facilities.

h. Requirements for the temporary or permanent abandonment of underground storage systems have been established.

i. The API recommended standards for the Interior Lining of Existing Steel Storage Tanks have been incorporated by reference.

It should be noted that the proposed Maryland Regulations have been reviewed and commented on by many different facets of the industry, including the membership of the Maryland Petroleum Council, the Mid-Atlantic Petroleum Distributors' Association, the Greater Washington/Maryland Service Station Association, a variety of government agencies and private consultants including a petroleum operations engineer. The input from all of these groups was invaluable in writing regulations which both government and industry can live with, while meeting the Administrations' goal of preventing spills. The only major point of contention between the Administration and the industry is the mandatory testing requirements of the proposed regulations. Industry maintains a position that they are overly burdensome and without substantial positive effect to warrant their inclusion. The Administrations' position is that mandatory testing will reveal a large number of leaking tank systems which are now in use and will also serve as a positive reinforcement to the daily inventory requirements at facilities where daily inventory may or may not be kept properly.

Currently, the Administration responds to underground spills to mitigate the immediate hazards involved as well as to identify the source, if possible, and to require whatever cleanup is feasible. This routinely requires personnel of the Administration to write orders requiring testing of storage systems and corrective actions such as installation of product recovery systems. In addition, it requires the Administration to dedicate large amounts of manpower to investigate for the source of these problems. The Administration is often required to install observation wells to try and pinpoint the source of underground spills. Whenever we are involved in controversial or sensitive cases, they may require that personnel of the Administration be present during all work done on scene to prevent tampering with evidence and to ensure that all work is done in accordance with standard practice. We literally begin talking in terms of man-weeks and man-months instead of man-days in order to properly

monitor underground spills.

One final area where Maryland has seen some positive effect in preventing underground spills is education. We have held three workshop type meetings open to anyone wishing to attend. Subjects covered have included prevention through proper installation, product recovery, the proposed Maryland regulations and live equipment demonstrations. The meetings were very well attended and we have seen the effect in that some of the speakers have been asked to speak at trade group meetings and work for some of the companies, helping them to prevent these problems. The subject of underground spills is now routinely discussed in Maryland among government agencies and industry groups. These meetings also gave everyone involved with underground spills a chance to meet each other under more casual circumstances than when a spill occurs. The Administration intends to host more such meetings during this year.

PROBLEM AREAS WITH UNDERGROUND SPILLS

Essentially, the organized response to underground spills is a "new" field. As I stated earlier, those of us who have responded to oil spills for longer periods of time, have dealt with underground leaks under many different circumstances. At first there were no standard techniques or equipment for use in underground spills. Finding equipment such as a pump to recover gasoline in a 50' deep well was a major task. Most pumps can not pump both water and gasoline because of non-compatible parts to one of the two fluids. If you could find a pump that could pump both fluids then it may or may not be rated for use in hazardous areas. The problems with recovering product were immense. Fortunately, many companies have seen the market for specialized equipment to deal with underground spills. The selection of equipment has dramatically increased since about 1981.

Along with the increase in available equipment, techniques have improved. There is quite an atmosphere of cooperation between government, oil companies, cleanup contractors and consulting firms in disseminating information on new cleanup or monitoring techniques.

Another major concern with underground spills is that they take excessive amounts of time to clean up. Quite often, the cleanup operations for medium to large underground spills will run for more than 10 years. Most cleanup operations only take care of the free floating oil and do not consider the removal of dissolved aromatic compounds which may be traveling with the water table. Today, there is increasing emphasis on removing

these soluble components from the groundwater. In order to do so, expensive air-stripping and activated carbon absorption equipment must be installed and continuously monitored. The average small spill which includes only removal and monitoring of free floating product will cost between \$1,000 and \$3,000 per month to maintain the recovery operation. Large spills can literally run into the millions of dollars for costs associated in removing the free floating oil and soluble aromatic compounds. These costs are far beyond the capabilities of most independent owners of service stations and other facilities with underground storage systems, not to mention the private homeowner who can be held liable for underground spills.

The costs for cleanup operations can be excessive, but they are in some cases small when compared to the awards given in law suits brought by parties who have had their wells and property contaminated. Punitive awards when coupled with real property damage often go over a million dollars. Recently 1.82 million dollars was awarded against EXXON Company, U.S.A. in Baltimore County, Maryland. Currently, a suit has been filed in Carroll County, Maryland in which the plaintiffs are seeking over 18 million dollars. There is a definite increase in litigation rising from damages created by underground spills. One needs only to call any insurance carrier who formerly has offered coverage for pollution and leaks to see what the ramifications of such litigation are. Some insurance companies have divided their leak insurance into slow leak and sudden loss categories. Nearly all companies have reconsidered the provisions of their policies and the standards by which they will judge insured facilities.

One of the greatest problems in dealing with underground spills is the great number of abandoned tanks. Some of these tanks are completely covered. Buildings have been placed over them or new parking lots have been paved over them. Others have simply not been in use for any number of years. We have encountered some abandoned tanks which have had substantial amounts of product (thousands of gallons) just waiting to leak out when the tank finally corrodes. The presence of these tanks complicates our investigation for the source of a spill and they quite often turn out to be the source of the spill.

SUGGESTIONS FOR FEDERAL INVOLVEMENT IN UNDERGROUND SPILLS

Legislation has been introduced in the House of Representatives (HR 4761) and in the Senate by Senator Durenberger, which will attempt to address the problem of underground spills. As I understand the proposed legislation by Senator Durenberger, (without having seen it), it will attempt to address four general issues. I would like to offer my comments on the four issues as

follow:

- A. A requirement for facilities to notify the State if they have abandoned tanks.

Comments: Not only should a facility be required to notify the State of an abandoned tank, they should also be required to abandon the tank in an appropriate manner. Maryland is taking a different approach on this issue than most other jurisdictions. If a facility has installed a non-corrosive tank system properly, there is essentially no reason why it should fail. Given that fact, and considering the enormous expense of underground storage systems, the Administration feels that removal of the tank or filling it with a solid inert material is not necessary. Instead, we have specified a system of closure which should allow the system to be used again, at a later date, without damage to the system.

- B. A requirement to notify the State of the existence and nature of all buried storage systems.

Comment: This is a monumental task which will require clerical assistance as well as inspectors working in the field and computer support. This program will obviously take a large budget to support it. Voluntary compliance with such a provision will only be carried out by the major companies and the more knowledgeable and civic minded smaller companies. The many thousands of storage systems which are under the ownership of private individuals in Maryland, will have to be sought out by the State personnel charged with this task. Additionally, I must point out that this requirement and the information it will generate is only useful if it has an intended purpose.

- C. The EPA will be required to develop performance standards for new tanks, ban the use of plain steel tanks and require leak detection devices.

Comments: These provisions will play a significant part in reducing the number of underground spills in the future. Such measures should be promulgated as swiftly as possible. The EPA has funded two studies which should assist them in this matter. The first is generally referred to as the "New York Study" and the second is the "Toxic Substance Storage Tank Containment Assurance and Safety Program" which was prepared for the State of Maryland.

- D. "Slow Leak" insurance will be mandatory for facilities with underground storage systems.

Comments: As I have mentioned earlier, underground spills are generally more costly to cleanup than the small businessman can afford. Having been in the position of dealing with individuals who can not afford to take care of spills created by their operation, I could only endorse such a measure. Such insurance should be required to include the cost of tests ordered during leak investigations, the cost of observation wells and other investigative techniques to determine the extent of spread of the product, the cost of recovery operations and the liabilities involved with underground spills.

In developing such requirements, I think that there are other factors which should be considered. They are as follow:

FUNDS FOR IMPLEMENTATION OF THE EPA PROGRAM:

If the EPA were to develop a model program for the State which is obligatory, then funding for the State would be essential. The costs and manpower requirements of a tank registration program would be greater than that which could easily be incorporated into an existing program. Another important aspect of this issue is the funds to respond to these incidents for mitigation of the environmental threat. As I have tried to show, the manpower requirements for monitoring these incidents are excessive. Funding assistance would help relieve this burden, not to mention the costs associated with State funded removal operations when the spiller can not be identified or refuses to commence cleanup.

Another major concern with respect to funding is that there should be a clear recognition that a division of responsibilities exists in Maryland relative to regulation and cleanup response based upon the nature of the material being stored. For example, in Maryland the Department of Health and Mental Hygiene is responsible for underground tanks storing hazardous materials while the Department of Natural Resources deals with the storage of petroleum products. Therefore, in terms of a tank registration program, there should be a provision in any legislation which recognizes the division of authority irrespective of the source of federal funds.

RESEARCH GRANTS:

Research is desperately needed to develop small and inexpensive water treatment systems for domestic wells which are contaminated by petroleum products. Currently there are activated carbon filters on the market which can do a fair job of removing

dissolved aromatic compounds. They are expensive to maintain and will not meet the approval of some health agencies because they do not monitor their own performance. By this, I mean that the first indication that they are not working is the odor or taste of oil in the effluent water. In one case in Maryland, we had an individual who could not smell or taste and whose well was contaminated with gasoline. She drank the contaminated water but could not tell. Therefore, if the treatment system does not automatically monitor its' own performance, it could still be dangerous.

CLOSING STATEMENT

The Water Resources Administration is dedicated to reducing the frequency and severity of underground spills in Maryland. I will offer whatever assistance Maryland can provide based on its' experience in responding to underground spills and developing regulations for the prevention of underground spills.

FOOTNOTES

- *1 State of Maryland, Department of Natural Resources Oil Spill Events, Fiscal Year 1983, July 1, 1982 - June 31, 1983. See Attachment 1.
- *2 This number was developed by a hand search of active files being investigated by the Water Resources Administration.
- *3 TulsaLetter, Published by PEI, November 24, 1983 Issue. Page 2.
- *4 Information from case files of the Water Resources Administration. See Attachment 2.

**STATE OF MARYLAND
DEPARTMENT OF
NATURAL RESOURCES**



JULY 1982 - JUNE 1983

OIL SPILL EVENTS

PREPARED BY

WATER RESOURCES ADMINISTRATION

OIL SPILL CONTROL DIVISION

INTRODUCTION

This report on "Oil Spill Events" has been compiled with data collected from the Water Resources Administration "Report of Spill" form. This form is used by spillers of oil as well as all government agencies responding to spill events. A sample of the "Report of Spill" form is on Page 2.

It must be remembered when reviewing this report, that the extent to which spill information is obtained is based on reports submitted to the Administration. This report therefore, cannot give a complete picture of all spills and events that have occurred throughout Maryland.

The following are some specific points with regard to the data in this report.

- 1.) The total number of responses will differ from the total number of events, because more than one agency may have responded to the same incident.
- 2.) In Table 7, Other represents an unknown spiller. For the "Source," in tables 3-8, Other represents home fuel tanks, transformers, motorcycles, gas cans and drums, etc.
- 3.) In Table 9, Other represents an unknown cause, expansion of fuel, objects in roadway, pump leaks, etc.
- 4.) In any given spill situation, gallonage figures are nearly always estimates. This is particularly true with reference to underground leaks. Because of the amount of time taken to close out these problems, the gallonage figures are inherently inaccurate.
- 5.) This report will not include any data the Water Resources Administration has received for spills involving hazardous materials.

WHITE OIL SPILL CONTROL DIVISION		PINK WRA ENFORCEMENT	YELLOW PERSON OR AGENCY REPORTING SPILL												
REPORT OF SPILL NO. _____		STATE OF MARYLAND DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES ADMINISTRATION TAWES STATE OFFICE BLDG. ANNAPOLIS, MD 21401													
		TELEPHONE: DAY (301) 263-3551 NIGHT OR HOLIDAYS (301) 269-3181													
PURSUANT TO THE PROVISIONS OF STATE LAW AND REGULATION (COMAR 08.05.04.07) THE PERSON RESPONSIBLE FOR AN OIL SPILL SHALL PREPARE A COMPLETE WRITTEN REPORT OF THE OCCURRENCE AND PROMPTLY SUBMIT IT TO THE ADMINISTRATION. THE WRITTEN REPORT MAY NOT BE USED IN ANY CRIMINAL CASE, EXCEPT AS A PROSECUTION FOR PERJURY OR FOR GIVING FALSE STATEMENT. THE ADMINISTRATION RESERVES THE RIGHT TO OBTAIN ANY FURTHER INFORMATION AS NEEDED.															
ANSWER ALL QUESTIONS AND GIVE APPROPRIATE DETAILS. RETURN TO THE ADMINISTRATION WITHIN 10 DAYS OF THE COMPLETION OF CLEANUP. PLEASE PRINT FIRMLY. USE A BALL POINT PEN. THIS REPORT MAY ALSO BE USED FOR MATERIALS OTHER THAN OIL.															
A Date of Spill Mo. _____ Day _____ Yr. 19____		Time of Spill _____ (Use 24 Hour Clock)													
B Location of Spill (Circle only one box) ☐ 1 Contained on land ☐ 2 Entered surface waters If 2 checked, name body of water: _____ If 17 checked, name body of water: _____ ☐ 3 Is below ground surface ☐ 4 Entered storm drain ☐ 5 Entered sanitary sewer 16 _____		C Total amount of Vehicle, Vessel or Tank (If unknown amount, put "U" in box 1) ☐ 56 _____ gallons ☐ 64 Amount Spilled (_____) gallons ☐ 72 Amount Recovered (_____) gallons													
D Type of Substance Spilled (Circle one or more) ☐ Gasoline ☐ Diesel Oil ☐ Kerosene ☐ No. 2 Oil ☐ Jet Fuel ☐ No. 1 Oil ☐ No. 3 Oil ☐ Fuel Oil ☐ No. 4 Oil ☐ Crude ☐ Waste Oil ☐ Asphalt ☐ Hazardous Material (must identify) ☐ Other (must identify) _____		E Source of Spill (Circle one box) ☐ Car ☐ Other Aircraft ☐ Truck ☐ Aviation ☐ Tank Truck ☐ Industry other than Oil Company ☐ Train ☐ School ☐ Oil Terminal ☐ Apartment Bldg. ☐ Service Station ☐ Unknown ☐ Ship ☐ Home Fuel Tank ☐ Barge ☐ Drums (Specify) _____ ☐ Other (Specify) _____ Vehicle Tag No. _____													
		F Cause of Spill (Circle one box) ☐ Accident ☐ Vandalism ☐ Grounding ☐ Mechanical Failure ☐ Barge Pumping ☐ Personnel Error ☐ Sinking ☐ Other (Specify) _____ ☐ Mystery Sinks ☐ Transfer Accident ☐ Tank Leak ☐ Pipe Leak ☐ Other (Specify) _____													
		G Attributing Cause (Circle one box) ☐ Vandalism ☐ Mechanical Failure ☐ Personnel Error ☐ Other (Specify) _____													
F Materials Used By You to Clean Up Spills (Circle one or more) <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Material</td> <td style="width: 50%;">Quantity</td> </tr> <tr> <td>☐ Sorbent</td> <td>_____ bags</td> </tr> <tr> <td>☐ Sorbent Booms</td> <td>_____ each</td> </tr> <tr> <td>☐ Contined</td> <td>_____ rolls</td> </tr> <tr> <td>☐ Oil Sore</td> <td>_____ boxes</td> </tr> <tr> <td>☐ Other (specify) _____</td> <td></td> </tr> </table>		Material	Quantity	☐ Sorbent	_____ bags	☐ Sorbent Booms	_____ each	☐ Contined	_____ rolls	☐ Oil Sore	_____ boxes	☐ Other (specify) _____		Total product removed by sorbent material _____ gallons If vacuum trucks or pumps were used to remove product in liquid form, give total product removed in liquid form: _____	
Material	Quantity														
☐ Sorbent	_____ bags														
☐ Sorbent Booms	_____ each														
☐ Contined	_____ rolls														
☐ Oil Sore	_____ boxes														
☐ Other (specify) _____															
G Where were clean-up materials disposed? (Circle one or more and give name) ☐ Landfill ☐ Oil Recovery Company _____ ☐ Other _____															
H Cost of Spill (Circle one or more boxes and give amount) ☐ Cleanup \$ _____ ☐ Loss of Product \$ _____ ☐ Loss of Equipment \$ _____ ☐ Other \$ _____ ☐ Total \$ _____		J Effects of Spill (List only one effects caused by the spilled material) ☐ Fatality ☐ Private Well Contaminated ☐ Injury ☐ Municipal Drinking Water Contaminated ☐ Waterfowl ☐ Industrial Water Intake Contaminated ☐ Fishkill ☐ Fire ☐ Shellfish ☐ Property Damage ☐ Other Wildlife ☐ Other (Explain) _____ Please Explain Effects: _____													
I What will be done to prevent a recurrence of spill? (Circle one or more boxes) ☐ Personnel Training ☐ Repair Mechanical Failure ☐ Increase Security ☐ Revise Operations Procedure ☐ Other (Explain) _____															
K Spill was cleaned up by (Circle one or more and give name) ☐ State Agency ☐ County or City Agency ☐ Petroleum Industry ☐ Private Industry ☐ Oil Spill Cleanup Contractor ☐ Other _____		L Person(s) Responsible for Spill (Circle one and give name and address) ☐ Government Name _____ ☐ Private Citizen Address _____ ☐ Private Industry ☐ Petroleum Industry if Company, give name and address ☐ Transportation Industry Name _____ ☐ Chemical Industry Address _____ ☐ Other _____ Oil Operations Permit No. _____													
M Person(s) Making Report Name _____ Address _____		Signature _____													

<u>AGENCIES RESPONDING TO SPILL INCIDENTS</u>	<u>RESPONSES</u>	<u>BAGS OF SORBENT USED</u>
Baltimore City Fire Department	1,459	2,468
Water Resources Administration	248	340
Maryland Port Administration	74	80
Washington County Fire Departments	72	269
Baltimore County Fire Departments	53	295
Anne Arundel County Fire Departments	46	124
Montgomery County Fire Departments	24	310
Howard County Fire Departments	22	85
Annapolis City Fire Departments	18	51
Queen Anne's County Fire Departments	12	53
Harford County Fire Departments	10	169
Allegany County Fire Departments	8	25
Wicomico County Fire Departments	7	32
Calvert County Fire Departments	3	18
Garrett County Fire Departments	3	7
Maryland Toll Facilities	3	15
Carroll County Fire Departments	2	11
Frederick County Fire Departments	2	4
State Highway Administration	2	2
Talbot County Fire Departments	2	3
Charles County Fire Departments	1	12
City of Frederick	1	1
Dorchester County Fire Departments	1	2
Prince George's County Fire Departments	1	10
Worcester County Fire Departments	1	4
TOTALS	<u>2,075</u>	<u>4,390</u>

THE FOLLOWING ARE BRIEF DESCRIPTIONS OF SPILL EVENTS

IN ORDER BY GALLONS SPILLED.

1. (30593) On June 11, 1983, a pipe leak at the Texaco, Inc. Oil Terminal caused approximately 16,963 gallons of marine diesel to be spilled. The majority of the spilled oil was contained inside the terminal. However, a small amount did enter Curtis Creek. At the completion of cleanup operations 95% of the oil was recovered.
2. (16778) On June 19, 1983, the Tug Blue Star owned by the Eastern Shore Marine, Inc. lost approximately 10,000 gallons of diesel oil after sinking in Hooper Strait. The combination of strong winds and rough water quickly spread out and broke up the slick. The Water Resources Administration deployed 738 feet of open water containment boom around the vessel. The U. S. Coast Guard hired a private contractor for cleanup operations and to bring in a barge for removing the remaining oil from the fuel tanks.
3. (23501) On February 17, 1983, a tank truck carrying 6,000 gallons of lube oil overturned in Pocomoke City spilling 4,920 gallons. Through the efforts of the local county fire department and State government agencies the spilled oil was contained on land. The owner of the truck, Oil Transport, Inc. contracted with a local company for cleanup operations.
4. (15405) On September 14, 1982, approximately 4,671 gallons of asphalt spilled from a tank truck owned by E. Stewart Mitchell, Inc. after being struck by another vehicle. The spilled product was contained on land and cleaned up by E. Stewart Mitchell, Inc. and a private contractor hired by them.
5. (23343) On December 19, 1982, approximately 4,000 gallons of transformer oil had spilled from a leak in a pipe coupling before the leak was discovered. The spill which occurred at the Potomac Electric Company, Largo Substation was contained within the substations containment sump and removed by a private contractor.
6. (23239) On August 20, 1982, an accident involving a Chessie System Train at the Kennecott Refining Corp. caused 3,500 gallons of diesel oil to spill. The diesel oil was contained and cleaned up on land.
7. (17711) On April 29, 1983, a pipe leak at the Amoco Oil Terminal caused a 3,000 gallon asphalt spill. The spill was contained and cleaned up inside the terminal.

8. (17747) On June 3, 1983, approximately 3,000 gallons of No. 2 oil was spilled from a G & M Oil Co. tank truck as a result of a vehicle accident. The spilled oil was contained in a stream and on land. A private contractor was hired to perform cleanup operations.
9. (23488) On December 18, 1982, a Chessie System Train was involved in an accident at the company facility in Allegany County. Approximately 3,000 gallons of diesel oil was spilled. The Chessie System personnel contained and cleaned up the spill.
10. (16673) On April 9, 1983, the Washington, D.C. based Andergo Oil Co., Inc. tank truck was traveling on Route 50 when the spring leaves at the rear wheel broke loose and punctured the trailer. Out of the total 6,000 gallons of No. 6 oil in the tanker, approximately 2,800 gallons spilled before the tank could be offloaded. All containment and cleanup operations were performed on land by fire department and State personnel as well as private contractors.
11. (27773) On January 26, 1983, approximately 2,700 gallons of No. 2 spilled from a Brock Fuel Oil Co., Inc. tank truck which was involved in a vehicle accident. A private contractor hired by Brock Fuel Oil Co. cleaned up the spilled fuel.
12. (04323) On October 14, 1982, a 10,000 gallon below ground fuel oil tank was discovered to be leaking at the Arundel Middle School in Odenton, Maryland. The County government personnel along with a private contractor performed cleanup operations by digging ditches with a back hoe. An estimated 2,500 gallons of fuel was discharged.

Water Resources Administration Responses

The Water Resources Administration responded to 45 vehicle accidents, 20 transfer accidents, 46 open water spills, 5 of which were in the Annapolis Anchorage area. The Administration also responded to 70 new below ground spills (leaks) and continued working on 11 cases from previous fiscal years. In addition, the Administration made 67 responses to miscellaneous spills.

TABLE 1

LOCATION AND NUMBER OF INCIDENTS

<u>LOCATION</u>	<u>NUMBER OF INCIDENTS</u>			
	<u>FY-80</u>	<u>FY-81</u>	<u>FY-82</u>	<u>FY-83</u>
Contained on Land	2,035	2,050	1,777	1,824
Contained on Surface Water	212	275	142	138
Entered Storm Drain	135	117	114	101
Is Below Ground Surface	38	41	31	77
Entered Sanitary Sewer	3	13	7	24

TABLE 2

PERCENTAGE BREAKDOWN OF ATTRIBUTING CAUSES

<u>FISCAL YEAR</u>	<u>NUMBER OF EVENTS</u>	<u>PERSONNEL ERROR</u>	<u>MECHANICAL FAILURE</u>	<u>VANDALISM</u>	<u>OTHER REASONS</u>
1980	2,423	30.3%	26.7%	3.9%	39.1%
1981	2,496	33.3%	30.1%	2.7%	33.9%
1982	2,071	34.8%	31.3%	3.1%	30.7%
1983	2,164	28.8%	33.9%	2.3%	35.0%

TABLE 3

NUMBER OF INCIDENTS
AND
AMOUNT SPILLED (GALLON) BY SECTOR AND SOURCE

PETROLEUM INDUSTRY

<u>SOURCE</u>	<u>INCIDENTS</u>	<u>GALLONS</u>
Tank Trucks	76	13,426
Service Stations	41	17,600
Other	24	2,054
Oil Terminal Facility	11	21,503
Trucks	9	92
TOTALS:	<u>161</u>	<u>54,675</u>

TABLE 4

PRIVATE INDUSTRY

<u>SOURCE</u>	<u>INCIDENTS</u>	<u>GALLONS</u>
Truck	111	2,742
Other	62	6,116
Facilities	27	2,913
Tank Truck	24	9,464
Fuel Tank	19	1,218
Service Station	17	3,374
Car	12	37
Drums	10	585
Ship	6	88
Apartment Buildings	4	2,370
Barge	3	156
Train	2	5,000
TOTALS:	<u>297</u>	<u>34,063</u>

TABLE 5

TRANSPORTATION INDUSTRY

<u>SOURCE</u>	<u>INCIDENTS</u>	<u>GALLONS</u>
Truck	84	2,826
Tank Truck	19	6,765
Other	15	941
Ship	7	123
Train	6	11,800
Barge	4	330
Car	3	59
Drum	3	100
Facility	3	202
Fuel Tank	1	7
TOTALS:	<u>145</u>	<u>23,153</u>

TABLE 6

GOVERNMENT

<u>SOURCE</u>	<u>INCIDENTS</u>	<u>GALLONS</u>
Other	26	533
Truck	25	141
School	23	7,602
Tank Truck	8	1,170
Facility	4	1,135
Service Station	4	3,000
Car	3	22
Fuel Tanks	3	360
Drum	2	85
Aviation	1	10
Ship	1	150
TOTALS:	<u>100</u>	<u>14,208</u>

TABLE 7

OTHER

<u>SOURCE</u>	<u>INCIDENTS</u>	<u>GALLONS</u>
Unknown	284	1,791
Other	73	7,817
Car	46	125
Truck	33	1,212
Fuel Tank	18	2,300
Tank Truck	7	333
Drums	5	191
TOTALS:	<u>470</u>	<u>13,769</u>

TABLE 8

PRIVATE CITIZEN

<u>SOURCE</u>	<u>INCIDENTS</u>	<u>GALLONS</u>
Car	687	2,611
Truck	93	1,354
Other	91	1,125
Fuel Tank	78	2,382
Unknown	24	22
Tank Truck	8	2,267
Service Station	7	44
Water Craft	5	225
Drums	2	8
TOTALS:	<u>995</u>	<u>10,038</u>

TABLE 9

NUMBER OF INCIDENTS BY CAUSE

<u>CAUSE</u>	<u>FY-80</u>	<u>FY-81</u>	<u>FY-82</u>	<u>FY-83</u>
Accident	668	696	540	573
Grounding	5	15	7	9
Bilge Pumping	12	5	6	4
Sinking	9	7	11	5
Mystery Slick	66	124	41	92
Tank Leak	486	511	501	495
Transfer Accident	188	195	239	116
Pipe Leak	148	243	269	210
Other	841	700	457	660

TABLE 10

EVENTS BY GALLONS SPILLED

<u>GALLONS SPILLED</u>	<u>NUMBER OF EVENTS</u>
0	60
1 - 10	1,296
11 - 100	413
101 - 1,000	108
1,001 - 10,000	35
10,001 - 100,000	1
100,001 - 500,000	0
OVER 1,000,000	0
UNKNOWN	251

The above figures show the number of events by gallons spilled. However, there was the potential for spills involving larger quantities. The following figures indicate the number of events by the total gallons involved.

<u>GALLONS INVOLVED</u>	<u>NUMBER OF EVENTS</u>
1 - 10	264
11 - 100	631
101 - 1,000	229
1,001 - 10,000	147
10,001 - 100,000	24
100,001 - 500,000	3
OVER 1,000,000	2
UNKNOWN	864

TABLE 11

GALLONS INVOLVED, SPILLED & RECOVERED

<u>TYPE PRODUCT</u>	<u>TOTAL INVOLVED</u>	<u>TOTAL SPILLED</u>	<u>TOTAL RECOVERED</u>
#2	488,755	29,741	13,104
#4	160,054	844	314
#5	565	84	57
#6	1,774,239	6,728	6,319
Diesel	168,635	40,199	32,120
Asphalt	5,785,264	10,511	6,511
Gasoline	467,144	34,479	8,598
Kerosene	143,361	5,465	931
Jet Fuel	30,742	2,063	1,948
Waste Oil	25,688	1,840	1,562
Other	34,232	17,952	11,683
TOTALS:	<u>9,078,679</u>	<u>149,906</u>	<u>83,147</u>

TABLE 12

NUMBER OF INCIDENTS IN CITY OR COUNTY

<u>COUNTY</u>	<u>FY-80</u>	<u>FY-81</u>	<u>FY-82</u>	<u>FY-83</u>
Allegany	24	23	14	18
Anne Arundel	144	131	157	132
Baltimore City	1,798	1,843	1,493	1,554
Baltimore	158	190	131	108
Calvert	3	3	12	18
Caroline	9	2	3	2
Carroll	11	8	4	4
Cecil	3	15	10	1
Charles	10	5	13	16
Dorchester	10	8	4	3
Frederick	10	14	12	16
Garrett	5	13	2	6
Harford	19	15	15	17
Howard	21	17	24	39
Kent	7	9	5	5
Montgomery	13	22	19	51
Prince George's	45	42	50	44
Queen Anne's	10	26	15	14
St. Mary's	10	3	6	4
Somerset	2	3	2	3
Talbot	3	6	4	4
Washington	75	72	53	81
Wicomico	28	19	20	12
Worcester	5	7	3	12

SUMMARY

The total number of events during Fiscal Year 1983 increased over Fiscal Year 1982 by 93.

The percentage of events caused by personnel error, or mechanical failure remains over 60% as in previous Fiscal Years.

The percentage of events occurring on land remains over 80%. Not included in that figure is below ground leaks. Discharges in this category have increased by 71.3% from Fiscal Year 1982.

Of the 149,906 gallons spilled, the petroleum industry was responsible for 36.5%, private industry 22.7%, transportation industry 15.4%, Government 9.4%, other 9.3%, and private citizens 6.7% of the total gallons spilled.

The data collected for this summary is from the Water Resources Administration "Report of Spill" form. This form is used by spillers of oil and by government agencies in Maryland which respond to spill incidents. Again, the continued cooperation between the Water Resources Administration and other government agencies participating in the Maryland Oil Spill Program have made this report possible.

Any inquiries should be directed to:

Water Resources Administration
Oil Spill Control Division
Tawes State Office Building
Taylor Avenue
Annapolis, Maryland 21401-9974
(301) 269-2104

ATTACHMENT 2

RECENT STORAGE SYSTEM FAILURES
BECAUSE OF IMPROPER INSTALLATIONS

1. TYPE OF FACILITY: Parking Garage
LOCATION: Baltimore, Maryland
DATE OF INCIDENT: December 2, 1984
AMOUNT SPILLED: 2,500 gallons of gasoline
CAUSE OF SPILL: A contractor improperly installed the pump line approximately 1/2" from the bottom of a fiberglass tank. The manufacturer recommends a 4" minimum clearance because, the tank will compress from top to bottom due to the pressure above it. When this tank compressed the pump line was forced through the bottom of the tank.
2. TYPE OF FACILITY: Service Station
LOCATION: Frederick, Maryland
DATE OF INCIDENT: Prior to January 25, 1984
AMOUNT SPILLED: Unknown, but presumed to be very small amount.
CAUSE OF SPILL: Improper installation of fiberglass product lines led to small cracks which produced "weeping type" leaks.
3. TYPE OF FACILITY: Service Station
LOCATION: Oxon Hill, Maryland
DATE OF INCIDENT: February 12, 1984
AMOUNT SPILLED: 1,300 gallons of gasoline.
CAUSE OF SPILL: A contractor improperly installed fiberglass product lines. Product came to the surface of the parking lot and overflowed into the street.
4. TYPE OF FACILITY: Service Station
LOCATION: Columbia, Maryland
DATE OF INCIDENT: Before February 17, 1984
AMOUNT SPILLED: Unknown but over 1,020 gallons of gasoline have been recovered so far.
CAUSE OF SPILL: A contractor improperly installed fiberglass lines and crushed two of them. This station had not even started operation, after the installation of the tank systems, when the spill was discovered.

ATTACHMENT #3

DEPARTMENT OF NATURAL RESOURCES

SUBTITLE 05 WATER RESOURCES ADMINISTRATION

03.05.04 OIL POLLUTION

DRAFT COPY 2-29-04

THIS ATTACHMENT HAS NOT BEEN INCLUDED WITH THIS COPY OF THE STATEMENT, DUE TO DUPLICATING COSTS.

U.S. SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

Robert W. McVety, Administrator
Solid and Hazardous Waste Section
Florida Department of Environmental Regulation

Washington, D.C.
March 1, 1984

Florida residents have a deep interest in protecting their water supplies from contamination by toxic substances. Over 90 percent of Florida's citizens get their drinking water from groundwater. The state's underground water supplies are especially vulnerable to contamination, due to our high groundwater table and porous soils.

During the past two years, Florida has experienced an increasing number of occurrences of groundwater contamination from leaking underground storage tanks. It seems that the large number of gasoline storage tanks installed in the 1950s and 1960s with the emergence of our interstate highway system are deteriorating at an alarming frequency, and have become a real threat to the state's groundwater quality. Generally, the first indication of a problem arises when someone tastes or smells gasoline odors in his drinking water. It has been said that one gallon of gasoline can contaminate a million gallons of water to an undrinkable level. Depending upon the rate and direction of movement of the groundwater, and the location of any private or public water supplies, contaminated water can reach a well in days, weeks, months, or years.

As with the management of hazardous waste, there are two concerns that must be addressed when dealing with leaking storage

tanks. First is the correction of past mistakes and mismanagement practices. In Florida, the 1983 legislature appropriated \$8.5 million to help clean up contamination. While the federal Superfund program does not have provisions to allow the cleanup of gasoline or other petroleum product discharges, the Florida program does. And we are using these state funds to address this problem. Cleanup can be a complex problem. For example, filters are not available that can cleanse the undrinkable gas-tainted water. I am submitting for the record a list of 83 sites we are currently aware of and are working to correct in Florida.

The second concern that must be addressed is a preventative program... one which provides better assurances that leaks will not occur, or at least be minimized and detected as soon as they do.

In this regard, the 1983 Florida Legislature authorized the Department of Environmental Regulation to establish a regulatory program governing underground and aboveground pollutant storage facilities. Pollutants are defined as "oil of any kind in any form, gasoline, pesticides, ammonia, chlorine, and derivatives thereof, ~~excluding~~ liquefied petroleum gases." The statute allows the department to adopt tank construction standards, permit requirements, maintenance and installation standards, and removal or disposal standards. The facilities regulated by statute are those non-residential stationary tanks which contain pollutants, and which have a storage capacity greater than 550 gallons. Excluded are the bulk petroleum storage facilities associated with our coastal protection laws.

In developing our regulatory program, we've learned that our assignment may be overwhelming. We simply do not know how many facilities we may be regulating. Similarly, the universe of materials that could be classified as pollutants under Florida law could be quite massive and perhaps unmanageable if all pollutants were regulated in the same manner. We also are concerned that any regulatory program developed must be both reasonable and enforceable. To better meet these unknowns, we have decided to phase our program, beginning with the regulation of storage tanks holding petroleum products used as fuels for transportation. This will include aboveground bulk storage facilities such as airports and jobber bulk plants, and underground tanks which might include retail and wholesale service stations, governmental agencies, and private fleet operations. In the underground tank category, we estimate more than 40,000 tanks exist at wholesale and retail locations alone, and an unknown number are associated with municipal, county and state governmental agencies as well as privately owned facilities, such as trucking companies rental car agencies, business fleets, or any private firm maintaining buried storage tanks.

We are planning to defer action on the regulation of other storage facilities such as power plants, home heating fuel suppliers, pesticide storage facilities, pressure vessels for storage of chlorine and ammonia, petroleum exploration and production facilities, temporary facilities largely associated with building and road construction, and the small users.

We have held two very well attended workshops on our proposed

regulations and have a third scheduled in two weeks. We anticipate that the first phase of our rule will be adopted by our Environmental Regulation Commission at its hearing on April 11.

I would like to briefly discuss how we intend to prevent future contamination problems from underground storage facilities with this first phase of our rule.

One of the most difficult issues we are facing is how to determine whether there has been a loss of pollutant from a leaking tank. The measured volume of gasoline in a tank is extremely sensitive to temperature changes. A one degree drop in temperature in a standard 10,000 gallon storage tank will result in an apparent loss of approximately seven gallons. At the service station level, temperatures are not considered in determining inventory losses. Our dilemma has been, what is a significant loss or gain, and what should be done if a significant loss or gain is detected? A major oil company has advised us that over 40 percent of its gasoline storage tanks show a loss of over one-half one percent on an annual basis; however, after investigating and rechecking records, the losses attributed to leaks or theft are reduced to less than one percent. Due to resource limitations, and the potential of being overwhelmed with paperwork, we have decided not to require notification to the department unless a one percent loss--or gain--is detected over a five-day inventory period, or unless 50 gallons is lost, whichever is greater. We are concerned with gains in inventory, because there is frequently the inflow of groundwater into the tank in areas where the tank is submerged into the ground waters. If

there is a significant loss or gain, records are to be checked for errors, accessible parts of the facility are to be inspected, calibration of the measuring system and dispensers is to be done, and if the source of loss cannot be determined, the entire system must be tested for leaks. If a leak is detected, the tank must be emptied and repaired, and the department notified.

Monitoring wells or continuous pollutant detectors will be required at new facilities, and existing facilities will be required to modify their tanks by lining them and installing wells or detection devices no later than 1990.

We are proposing that newly installed underground tanks be either cathodically protected steel, glass reinforced-plastic, steel clad with reinforced plastic, or double-walled steel or plastic. Our proposed rule does not allow installation of bare steel or standard steel tanks. Monitoring wells are to be installed at each facility and checked every two weeks for oily sheen or odor, or be otherwise tested for traces of fuel.

We are requiring registration of all existing facilities, and notification of the department upon abandonment, sale, modification, when testing is done, and if discharges or leaks are discovered. We are concerned that abandoned tanks are commonly sold and reused without being restored to good condition. Our rules address this.

The proposed standard allows the department to require testing of a tank if it fails to comply with state rules, if the well indicates a discharge has occurred, or if groundwater contamination exists and the facility is reasonably likely to be a

source of the problem.

Florida law also requires each owner or operator of a facility to establish and maintain evidence of financial responsibility to cover any liabilities associated with spills or facility failures. We are deferring standards in this area.

In our rule, we have relied upon the recommendations of several standard-setting associations, such as the American Petroleum Institute, the American National Standards Institute, the National Association of Corrosion Engineers, the National Fire Protection Association, the American Society of Testing and Materials, and the Underwriters Laboratories standards. The expertise developed by these organizations was used to assist us in establishing our standards.

The proper management and control of gasoline storage is fairly well understood. Regulations covering storage facilities for gasoline and similar transportation related fuels can be developed without major research efforts. However, due to the large number of facilities falling into this category, caution needs to be taken to develop a manageable and enforceable program.

The regulation of facilities storing other kinds of hazardous materials will require much more research.

To conclude, I believe Florida is developing a strong and reasonable storage tank program at the state level. This program is being established in a relatively short period of time and is quite comprehensive given the resource limitations within which we had to operate. There is, of course, room for improvement. The

identification of appropriate substances other than transportation fuels and the proper management standards for these substances are key factors to a successful program.

There is an immediate need for EPA to provide training and technical assistance to both industry and state governments if these materials are to be properly managed. Also, proper enforcement is critical to the program's success. The legislation passed by the 1983 Florida Legislature showed an increased awareness of the leaking storage tank problems facing the state. These problems are not limited to Florida. It is a national issue that impacts every state. We encourage you to consider our experience as you prepare legislation. We will be pleased to work with you on this matter.

STATE OF FLORIDA
PROPOSED REGULATION CONCERNING STORAGE TANKS

CHAPTER 17-61

STATIONARY TANKS

17-61.01 Introduction and Scope.

(1) In Section 376.30, Florida Statutes, the Legislature finds and declares that:

(a) the storage of pollutants within the state is a hazardous undertaking and that the discharge of pollutants poses a great threat to the environment and the citizens of Florida, and

(b) the preservation of surface water and groundwater quality is a primary public concern and the benefit of regulating the storage of pollutants outweighs the burden imposed on facilities by these rules.

(2) This chapter establishes rules regulating underground and aboveground pollutant storage facilities. In addition to the requirements of this chapter, facilities ~~are~~ may be subject to the groundwater requirements of Chapters 17-3 and 17-4, FAC.
Specific Authority: 376.303, F.S. Law Implemented: 376.303, F.S.
History: New

17-61.02 Definitions.

(1) "Abandoned" means a storage system which:

(a) is not intended to be returned to service, or

(b) has been out of service for over three (3) years,

or

(c) cannot be tested in accordance with the requirements of this Chapter.

(2) "Aboveground tank" means that more than ninety (90) percent (90%) of the tank volume is not buried below the ground surface. An aboveground tank may either be in contact with the ground, or elevated above it.

CODING: Words underlined are additions;
Words in ~~struck through~~ type are
deletions from existing law.

1 (3) "API" means American Petroleum Institute.

2 (4) "ASTM" means American Society for Testing and
3 Materials.

4 (5) "Department" means the Department of Environmental
5 Regulation.

6 (6) "Discharge" shall include, but not be limited to, any
7 spilling, leaking, seeping, pouring, emitting, emptying, or
8 dumping of any pollutant which occurs and affects lands and the
9 surface waters and groundwaters of the state not regulated by
10 Sections 376.011-376.21, Florida Statutes.

11 (7) "Discovery" means either actual discovery or knowledge
12 of the existence of the abandoned facility or discharge.

13 (8) "Emergency replacement" means the replacement of the
14 damaged parts of a storage system when that storage system is
15 leaking and cannot be repaired to meet the standards contained in
16 Sections 17-61.05 and 17-61.06.

17 (9) "Existing" means a facility or tank for which
18 installation of a tank began prior to September 1, 1984.

19 (10) "Facility" means any nonresidential location or part
20 thereof containing a stationary storage system or systems which
21 contain pollutants, which have an individual storage capacity
22 greater than 550 gallons, and which are not regulated by Sections
23 376.011 - 376.21, Florida Statutes.

24 (11) "Impervious material" means a material of sufficient
25 thickness, density and composition (e.g., concrete, metal,
26 plastic, clay) that will prevent the discharge to the lands,
27 ground waters, or surface waters of the state of any pollutant
28 for a period at least as long as the maximum anticipated time
29 during which the pollutant will be in contact with the material.

30 (12) "In service" means a storage system which contains
31 pollutants and has pollutants regularly added or withdrawn.

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deletions from existing law.

1 (13) "Integral piping system" means continuous on-site
2 wetted pipes within the facility used in the transfer or
3 transmission of pollutant to and from a storage tank.

4 (14) "NACE" means National Association of Corrosion
5 Engineers.

6 (15) "New" means a facility or tank for which the
7 installation of a tank began on or after September 1, 1984.

8 (16) "NFPA" means National Fire Protection Association,
9 Inc.

10 (17) "Non-residential" means the primary purpose of the tank
11 is the operation of a business rather than domestic use such as
12 home heating at the facility.

13 (18) "Operator" means any person operating a facility
14 whether by lease, contract, or other form of agreement.

15 (19) "Out of service" means a storage system which:

16 (a) is not in use; that is, which does not have
17 pollutants regularly added to or withdrawn from the storage
18 system; and

19 (b) is intended to be placed in service.

20 (20) "Owner" means any person owning a storage system or
21 part thereof.

22 (21) "Person" means any individual, partner, joint venture,
23 corporation; any group of the foregoing, organized or united for
24 a business purpose; or any governmental entity.

25 (22) "Pipe" means ~~a stationary device~~ any hollow cylinder
26 or tubular conveyance which is constructed of non-earthen
27 materials (e.g., concrete, metal, plastic, glass) which
28 ~~provide structural support~~ and is designed to transport
29 pollutant.

30 (23) "Pollutant" in accordance with Section 376.32(6) is
31 interpreted to mean:

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1 (a) "oil of any kind and in any form" and "derivatives
2 thereof" to include, but not be limited to, crude petroleum or
3 liquid products that are derived from crude petroleum by
4 distillation, cracking, hydroforming, and/or other petroleum
5 refinery processes to include "gasoline";

6 (b) "pesticides" means all preparations intended for
7 use as insecticides, rodenticides, nematocides, fungicides,
8 herbicides, amphibian and reptile poisons or repellents, fish
9 poisons or repellents, mammal poisons or repellents, invertebrate
10 animal poisons or repellents, plant regulators, plant defoliants,
11 and plant desiccants. A product shall be deemed to be a
12 pesticide regardless of whether intended for use as packaged or
13 after dilution or mixture with other substances, such as carriers
14 of baits. Products intended only for use after further
15 processing or manufacturing, such as grinding to dust or more
16 extensive operations, shall not be deemed to be pesticides.
17 Substances which have recognized commercial uses other than uses
18 as pesticides shall not be deemed to be pesticides unless such
19 substances are:

- 20 1. specially prepared for use as pesticides, or
- 21 2. labeled, represented, or intended for use as
- 22 pesticides;

23 (c) "ammonia" and "derivatives thereof" include, but
24 are not limited to, anhydrous liquid ammonia (NH_3), ammonia in
25 aqueous solution (NH_4OH), ammonium salts or other liquid
26 chemical preparations which when discharged release free ammonia
27 (NH_3), or ammonium ion (NH_4^+);

28 (d) "chlorine" and "derivatives thereof" include, but
29 are not limited to, anhydrous liquid chlorine (Cl_2), chlorine
30 in aqueous solution ($\text{H}^+ \text{HOCl Cl}^-$), compounds containing
31 hypochlorite (ClO^-), chlorite (ClO_2^-), chlorate

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1 (ClO₃⁻), perchlorate (ClO₄⁻) ions, and other liquid
 2 preparations which, when discharged, release free chlorine (Cl or
 3 Cl₂) or any of the above chlorine-containing ions.

4 (24) "Pollutant-tight" means a material which is not subject
 5 to significant chemical or physical deterioration by the
 6 pollutant which is or could be contained therein so as to prevent
 7 discharge of the pollutant.

8 (25) "Retrofit" means to modify a storage system to meet
 9 new-system standards contained in this Chapter.

10 (26) "Secretary" means the secretary of the Department of
 11 Environmental Regulation.

12 (27) "Significant loss or gain" means a loss or gain of
 13 pollutant in a storage system over five (5) consecutive inventory
 14 periods which exceeds one percent (1%) of the storage system
 15 capacity, or one percent (1%) of the output, or 50 gallons,
 16 whichever is greater.

17 (28) "Stationary" means a tank or tanks not meant for
 18 multiple site use or a tank or tanks which remain at the facility
 19 site for a period of 180 days or longer.

20 (29) "Storage system" means a storage tank and all
 21 associated integral piping, excluding aboveground dispensing
 22 units.

23 (30) "Substantial modifications" shall mean the construction
 24 of any additions to an existing storage system or restoration,
 25 refurbishment or renovation which:-----

26 -----~~(a)-increases-the-capacity-of-an-existing-storage~~
 27 ~~system-by-more-than-five-(5)-percent-of-the-present-capacity,~~
 28 ~~or-----~~

29 -----~~(b)~~ significantly impairs or affects the physical
 30 integrity of the storage system or its monitoring system.

31 (31) "Tank" means an enclosed stationary device which is

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constructed primarily of non-earthen materials (e.g., concrete, metal, plastic, glass) ~~and which provide structural support~~ and is designed for the primary purpose of storing pollutants.

(32) "UL" means Underwriters Laboratories, Inc.

(33) "Underground tank" means that ten percent (10%) or more of the tank volume is buried below the ground surface.

Specific Authority: 376.303, F.S. Law Implemented: 376.303, F.S.

History: New

17-61.03 Referenced Standards.

(1) Referenced standards are available ~~as follows:~~ for inspection at the Department of Environmental Regulation's District and Tallahassee Offices and from the following sources:

(a) American Petroleum Institute (API), 1220 L Street, N.W., Washington, D.C. 20005;

(b) National Association of Corrosion Engineers (NACE), P.O. Box 218340, Houston, Texas 77218;

(c) National Fire Protection Association (NFPA), Batterymarch Park, Quincy, Massachusetts 02269;

(d) American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, Pennsylvania 19103; and

(e) Underwriters Laboratories (UL), 333 Pfingston Road, Northbrook, Illinois 60062.

(2) Titles of documents.

Specific references to documents listed in (a) through (g) ~~(e)~~ below are made throughout this Chapter. Each of these documents or parts thereof are adopted and incorporated as standards only to the extent that they are specifically referenced in this Chapter.

(a) National Fire Protection Association Standards.

1. Standard Number 30, 1981, "Flammable and

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- 1 Combustible Liquids Code";
- 2 2. Standard Number 329, 1983, "Underground Leakage
- 3 of Flammable and Combustible Liquids".
- 4 (b) American Petroleum Institute Standards.
- 5 1. Standard Number 650, 1980, "Welded Steel Tanks
- 6 for Oil Storage," Seventh Edition;
- 7 2. Standard Number 620, 1982, "Recommended Rules
- 8 for Design and Construction of Large, Welded, Low-Pressure
- 9 Storage Tanks," Seventh Edition;
- 10 3. Publication 1110, 1981, "Recommended Practice
- 11 for the Pressure Testing of Liquid Petroleum Pipelines";
- 12 4. Specification Number 12B, 1977 (and Supplement
- 13 1, 1982), "Specification for Bolted Tanks for Storage of
- 14 Production Liquids," Twelfth Edition;
- 15 5. Specification Number 12D, 1982 (and Supplement
- 16 1, 1983), "Specification for Field Welded Tanks for Storage of
- 17 Production Liquids," Ninth Edition;
- 18 6. Specification Number 12F, 1982 (and Supplement
- 19 1, 1983) "Specification for Shop Welded Tanks for Storage of
- 20 Production Liquids," Eighth Edition;
- 21 7. Bulletin 1615, 1979, "Installation of
- 22 Underground Petroleum Storage Systems";
- 23 8. Publication 1632, 1983, "Cathodic Protection of
- 24 Underground Petroleum Storage Tanks and Piping Systems," First
- 25 Edition;
- 26 9. Publication 1604, 1981, "Recommended Practice
- 27 for Abandonment or Removal of Used Underground Service Station
- 28 Tanks"; and
- 29 10. Publication 1631, 1983, "Recommended Practice
- 30 for the Interior Lining of Existing Steel Underground Storage
- 31 Tanks."

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(c) National Association of Corrosion Engineers
Standard Number RP-01-69 "Control of External Corrosion on
Underground or Submerged Metallic Piping Systems" (1976).

(d) Underwriters Laboratories standards.

1. Specification 58 "Steel Underground Tanks for
Flammable and Combustible Liquids" (1981);

2. Specification 1316, "Standard for Glass
Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum
Products"; and

3. Specification 142 "Steel Aboveground Tanks For
Flammable and Combustible Liquids" (1982).

(e) American Society for Testing and Materials
Specification D4021-81, "Standard Specification for
Glass-Fiber-Reinforced Polyester Underground Petroleum Storage
Tanks".

Specific Authority: 376.303, P.S. Law Implemented: 376.303, P.S.
History: New

17-61.04 Applicability.

~~-----{1}-The-tank-standards-in-this-Chapter-apply-only-to
facilities-listed-in-Subsection-{2}-below--However,-the
department-will-regulate-facilities-which-are-not-included-in
this-rule-at-a-later-date-~~

~~{2}~~ (1) Standards contained in Sections ~~17-61.05~~ through
~~17-61.07~~ this Chapter shall apply only to those facilities
which receive, store, or use petroleum products used which
are distributed from such facilities for use as fuel in vehicles,
including, but not limited to, those used on and off roads,
aircraft, watercraft, and rail~~-,~~ and Additionally,-this-rule
~~shall-apply-only-to-such-facilities~~ which receive, store, or
use either more than 1,000 gallons in any one calendar month, or

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1 more than 10,000 gallons in any calendar year. Such The
 2 above described facilities which do not receive, store, or use
 3 more than 1,000 gallons in any one calendar month, or more than
 4 10,000 gallons in any calendar year shall only meet the
 5 requirements in 17-61.06(1)(b)1. or 17-61.06(2)(b)1. for new tank
 6 construction standards.

7 ~~(3)~~ (2) Exemptions.

8 The following are exempt from the requirements of this
 9 Chapter:

10 (a) Stationary storage systems which contain liquefied
 11 petroleum (lp) gas;

12 ~~----- (b) Facilities regulated by Sections 376.011 through~~
 13 ~~376.217, P.S.~~

14 ~~(c)~~ (b) Stationary storage systems whose contents
 15 have a softening point above 100°F.

16 ~~(d)~~ (c) Aboveground tanks which are elevated above
 17 the soil and comply with subparagraph 17-61.06(1)(c)2. shall
 18 comply only with the requirements of paragraph 17-61.065(4)(b)
 19 concerning discharges, and subsection 17-61.05(1) concerning
 20 registration and notification, and subparagraphs 17-61.06(1)(d)2.
 21 and 3. concerning repair.

22 Specific Authority: 376.303, F.S. Law Implemented: 376.303, F.S.

23 History: New

24 17-61.05 General Provisions.

25 (1) Registration and Notification Requirements.

26 (a) Each owner or operator shall register the following
 27 on forms provided by the department:

- 28 1. All existing facilities by December 31, 1984.
- 29 2. All new storage systems or facilities at least
- 30 ten (10) days prior to start of installation of tanks except in
- 31

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1 cases of emergency replacement.

2 3. A non-pollutant containing installation which is
3 to be converted to a facility, at least ten (10) days prior to
4 the placement of pollutants in such a facility.

5 (b) Each owner or operator shall make notification of
6 the following on forms provided by the department.

7 1. All storage systems within ten (10) days of
8 abandonment.

9 2. Facility sale within ten (10) days of the sale.
10 Notice shall be made by the seller.

11 3. Retrofitting of existing facilities within ten
12 (10) days of completion.

13 4. Results of tank testing which reveals a
14 discharge within three (3) working days of testing.

15 5. Discharges ~~on-pervious-surfaces~~ exceeding
16 100 gallons on pervious surfaces as described in Section
17 17-61.05(4)(b) within three (3) working days of discovery.

18 6. Positive response of a detection device,
19 monitoring well test or sample or laboratory report within three
20 (3) working days of discovery.

21 (2) Overfill protection.

22 No person shall construct, install, use, or maintain any
23 new facility without providing a reliable means of detecting and
24 preventing an overfilling condition of a storage system before
25 any discharge can occur. Overfill protection may consist of:

26 (a) an impervious containment system, or

27 (b) a tight fill device, or

28 (c) another equivalent design approved by the
29 department.

30 (3) Storage system status.

31 A facility may contain storage systems which are:

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(a) In-service storage systems.

Any pollutant may be placed in an in-service storage system if the storage system is pollutant-tight and meets the requirements of this Chapter.

(b) Out-of-service storage systems.

1. An out-of-service storage system shall have recorded a weekly inventory of contents and the results of monthly leak detection and monitoring system examinations unless the storage system contains no free liquid pollutant or vapors. An out-of-service storage system which contains no pollutant shall be secured against tampering and unauthorized filling and inspected monthly for signs of damage to the security system. The storage system may be filled with water for ballasting. The water shall be disposed of in an environmentally sound manner consistent with department rules when pumped out of the system.

2. A storage system may be kept in the out-of-service status for more than three (3) years and not deemed abandoned if approved by the department.

(c) Abandoned storage systems.

1. The owner of an abandoned storage system must within 90 days after discovery, pump the system clean of free liquid, and remove the storage system in a safe manner, except that underground tanks may be filled with sand, concrete, or other inert material in lieu of removal, in accordance with the requirements in API Bulletin 1604, 1981, Chapter 2.

2. The owner or operator of an abandoned tank shall not dispose of it unless he meets the requirements of API 1604, Chapters 3 and 6, and:

a. the tank is removed for sale or use elsewhere, in which case it must be permanently labeled "Not For Food Use" if it has at any time contained leaded fuel, cleaned,

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1 and made vapor free to be safe in transit; or

2 b. the tank is disposed of as junk by rendering
3 it vapor free, and dismantling or perforating it in a safe manner
4 so as to render it unfit for further use.

5 3. An abandoned storage system may be brought into
6 service only if it ~~meets-all-the-requirements-for-a-new~~
7 storage-system has been completely retrofitted in compliance
8 with the applicable requirements in Section 17-61.06.

9 4. No person shall place pollutants in an abandoned
10 storage system.

11 (4) Record Keeping, Discharge Reporting and Contamination
12 Cleanup

13 (a) Records required in Sections 17-61.05, and 17-61.06
14 shall be maintained in permanent form for two (2) years and shall
15 be available for inspection by the department at the facility.
16 If records are not kept at the facility they shall be available
17 at the facility or other location approved by the department upon
18 two (2) working days notice. Records of the following are
19 required as a minimum.

20 1. Measurements taken and reconciliations of
21 inventory.

22 2. Results of examinations of monitoring wells and
23 other leak detection systems.

24 3. Dates of retrofitting of existing storage
25 systems.

26 4. Results of maintenance examinations of storage
27 systems.

28 5. Results of interior examinations of aboveground
29 tanks.

30 6. Results of all NFPA 329 tests of underground
31 tanks.

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1 7. Results of tests of pipes.

2 8. Descriptions of repairs.

3 (b) Any person discharging pollutants from a facility
4 ~~as prohibited by Sections 376.30---376.315, -P+S:~~ described in
5 Section 17-61.04(1) shall:

6 1. immediately undertake to contain, remove, and
7 abate the discharge; and

8 2. in the case of a discharge to the groundwater in
9 violation of applicable standards, as soon as possible institute
10 such further corrective action as necessary under the provisions
11 of Section 17-4.245(7), FAC.

12 (c) Leak Detection Systems, Inventory Schedules and
13 Loss Investigation.

14 1. Leak detection devices.

15 a. All continuously operating leak detection
16 systems or devices shall be installed, maintained, and operated
17 in accordance with manufacturer's requirements, and shall include
18 a warning device to indicate the presence of a leak of pollutant
19 or other failure or breach of integrity. A leak detection device
20 shall be inspected at least once a month to determine that the
21 device is functioning.

22 b. All monitoring wells for which manual test
23 devices or methods are used shall be tested at least once a
24 month in a manner which will indicate the presence of a pollutant
25 leak or other failure or breach of integrity.

26 c. All monitoring wells not tested with
27 automatic or manual detection devices or methods shall be tested
28 at least once a month in accordance with the requirements in
29 17-61.05(5)(b) below.

30 d. A monitoring well which contains less than
31 one (1) foot of water may not be tested by removal of a sample as

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described in Section 17-61.05(5)(b) below, but must be tested with a manual or automatic detection device method.

2. Inventory records.

a. All facilities shall maintain inventory records for each pollutant-containing tank as required in Section 17-61.06. The data required shall be accumulated for each day a tank has pollutants added or withdrawn, but not less frequently than once a week.

b. Losses or gains from each day's inventory shall be averaged for each five (5) consecutive readings or once a week. For any average which is a significant loss or gain, the investigation procedure below shall be followed.

3. Investigation procedure.

The investigation shall not stop until the source of the discrepancy has been found, the tank has been tested, repaired, or replaced, or the entire procedure has been completed.

a. Inventory, input, and output records shall be checked for arithmetical error.

b. Inventory shall be checked for error in measurement.

c. If the significant loss or gain is not reconcilable by steps a. and b., or cannot be affirmatively demonstrated to be the result of theft, the accessible parts of the storage system shall be checked for damage or leaks.

d. Monitoring wells and leak detection systems shall be checked for signs of a discharge.

e. Calibration of the inventory measuring system and any dispensers shall be checked.

f. The entire storage system, excluding the vent but including joints and remote fill lines, shall be tested

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1 in accordance with the applicable portions of Section 17-61.06.

2 g. If a discharge or leak is discovered, the
3 requirements of applicable Sections 17-61.06(1)(d), (2)(d), or
4 (3)(d) shall be met.

5 (5) Monitoring wells.

6 (a) Monitoring wells used to meet the requirements of
7 Section 17-61.06 shall be designed to meet the following
8 specifications, or shall be a part of an approved groundwater
9 monitoring plan for the pollutant storage facility pursuant to
10 17-4.245. Monitoring wells installed before the effective date
11 of this Chapter may be used as a part of a monitoring system as
12 approved by the department. The well casing shall:

- 13 1. be a minimum of two (2) inches in diameter;
- 14 2. be slotted from the bottom to within at least
15 two (2) feet of ground-surface above the normal annual high
16 water table;
- 17 3. have a minimum slot size of ±025 .010 inches;
- 18 4. be completed by backfilling with appropriate
19 clean filter pack or wrapping in an appropriate filter cloth to
20 prevent clogging under soil conditions where silty fines will
21 blind the minimum slot size;
- 22 5. be constructed of schedule 40 PVC or other
23 material which is impervious to the pollutant stored;
- 24 6. be sealed into the bore hole at the surface with
25 an impervious barrier two-(2)-feet-deep-and-at-least-four-(4)
26 feet-in-diameter-around-the-well designed to prevent
27 contamination of the well by surface pollutants and damage to the
28 well;
- 29 7. be equipped with a locking-air-and watertight
30 cap; and
- 31 8. be of sufficient length that:

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a. the bottom of the casing shall extend one (1) foot into the undisturbed soil beneath the excavation but no deeper than 25 feet; or

b. the casing shall extend to within six (6) inches of the bottom of a secondary containment, but shall not contact the containment.

(b) All monitoring wells shall:

1. be placed ~~in-the-excavation-in-which-the underground-storage-system-or-integral-piping-system-is~~ located as required in Section 17-61.06; and

2. if water enters the well, be developed upon drilling until the water is clear and relatively sand free by overpumping, bailing, surging with compressed air, backwashing, a combination of the above, or other methods approved by the department; and

3. if not equipped with a continuously functioning detection device, or tested with a portable device inserted into the well, be sampled by the removal of at least one (1) cup of fluid from the well, using a Kemmerer-type sampler or a sampler of similar design. The fluid shall be taken from the surface of the water table. The fluid shall:

a. be poured into a clean, clear glass container kept for the purpose, and examined for signs of an oily sheeny layer or odor of pollutant; or

b. be tested at the site ~~with-an-instrument which-is-capable-of-detecting-pollutant-at-limits-set-by department-ruler~~ or

c. be sent to a laboratory ~~whose-detection limits-at-least-equal-those-in-br-above~~ and tested.

(d) (c) The positive response of a detection device, the presence of a sheeny-layer or odor of pollutant, or the

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positive report of a laboratory that the sample contains pollutant shall be treated as a discharge unless the owner or operator affirmatively demonstrates that no discharge has occurred.

~~(e)~~ (d) All wells shall be kept capped when not being tested.

(6) Required testing.

(a) In addition to the testing requirements of Section 17-61.05(4)(c)3.~~e-f.~~, the owner or operator of a storage system shall test the entire storage system whenever the department has ordered that such a test is necessary to protect the lands, ground waters, or surface waters of the state. The department may order a test if:

1. the operator of a storage system has failed to comply with the provisions of ~~Chapter 17-61~~ Section 17-61.06; or

2. a discharge detection device or monitoring well indicates that pollutant has been or is being discharged; or

3. groundwater contamination exists in the vicinity and the facility is reasonably likely to be a source of the contamination.

(b) Testing shall be conducted in accordance with the requirements of Sections 17-61.06(1)(d)4., 17-61.06(2)(d)4., and 17-61.06(3)(a)4.

Specific Authority: 376.303, F.S. Law Implemented: 376.303, F.S.

History: New

17-61.06 Facility Construction, Operation and Repair Standards.

(1) Aboveground Facilities

(a) All storage tanks.

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Inventory records as required by subparagraph
17-61.05(4)(c)2. shall be maintained for all aboveground tanks
 and shall include:

1. pollutant contained,
2. ~~daily~~ physical inventory,
3. inputs and outputs of pollutant, and
4. reconciliation of the above.

(b) New storage tanks.

1. No person shall install, use or maintain any new
 aboveground ~~facility~~ storage system in a manner which will
 allow the discharge of a pollutant to the lands, groundwaters, or
 surface waters of the state, and without meeting the requirements
 contained in NFPA 30, Chapters 2-1, 2-2, 2-5, and 2-7; API
 Standards 650, 620, 12B and Supplement 1, 12D and Supplement 1,
 12F and Supplement 1, and UL 142, as applicable.

2. No person shall use or maintain any new
 aboveground storage system without having constructed around and
 under it an impervious containment system, including a dike
 enclosing the tank or tanks, conforming to the requirements of
 NFPA 30, Chapter 2-2.3, regardless of whether or not the tank is
 in contact with the containment or supported above it.

a. The dikes and the entire areas enclosed by
 the dikes including the area under the tanks shall be made
 impervious to the types of pollutants stored in the tanks.

b. Drainage of precipitation from within the
 diked area shall be controlled in a manner that will prevent
 pollutants from entering the lands, groundwaters or surface
 waters of the state in excess of water quality standards
 established by department rule.

3. No person shall construct, install, use or
 maintain any new aboveground metal tank making contact with the

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1 soil unless portions in contact with the soil are corrosion
2 protected. Such corrosion protection shall be in accordance with
3 NACE Standard Number RP-01-69.

4 (c) Existing storage tanks.

5 1. Commencing January 1, 1990, no person shall use,
6 maintain or fill with pollutants any existing in-service
7 aboveground facility storage system without conforming to all
8 of the requirements of Section 17-61.06(1)(a) and (b) above,
9 except that impervious barriers are not required under existing
10 field-erected tanks in contact with the soil. In lieu of the
11 impervious barrier, existing field-erected tanks in contact with
12 the soil shall have:

13 a. the interior bottom and at least 18 inches
14 of the interior sides joining the bottom of the tank coated with
15 a glass fiber-reinforced epoxy coating or other suitable material
16 which is impervious to the pollutant to be stored; or

17 b. a network of monitoring wells installed
18 outside of and around the dike surrounding the tank or tanks.
19 There shall be at least four wells in each network, with no two
20 consecutive wells farther apart than 150 feet. Each well shall
21 be within 25 feet of the dike, and may be part of more than one
22 network; or

23 c. a groundwater monitoring plan submitted and
24 implemented for the pollutant storage facility in accordance with
25 the requirements in Chapter 17-4.245, FAC, or

26 d. a copy of an ~~an~~-approved Spill Prevention
27 Control and Countermeasure ~~P~~plan for the pollutant storage
28 facility as required by 40 CFR Part 112, submitted to the
29 department; or

30 e. the portions of the tank in contact with the
31 soil corrosion protected in accordance with NACE RP-01-69.

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deletions from existing law.

2. Commencing January 1, 1990, no person shall use, maintain or fill any existing tank elevated above the soil without placing an impervious containment system under and around it and sealed to its supports in accordance with NFPA 30, Section 2-2.3.3.

~~-----3.--No-person-shall-substantially-modify-or-cause the-substantial-modification-of-any-aboveground-tank-without complying-with-the-provisions-of-Subsection-(b)-above-~~

(d) Pollutant leaks, maintenance, and repairs.

1. The owner or operator of an aboveground facility shall at least once a month inspect the exterior of each pollutant-containing tank and the dike and impervious containment surrounding the tank for wetting, discoloration, blistering, corrosion, cracks, or other signs of structural damage, paying particular attention to the condition of the containment at the base of the tank.

2. Any aboveground tank which shows signs of ~~surface-or-structural~~ damage which could impair the ability of the tank to retain pollutants shall, as soon as practicable, be drained of sufficient contents to permit repair.

3. When an aboveground tank is found to be leaking, the leak shall be contained as soon as practicable or the tank must be drained of sufficient contents to prevent further leakage and allow repair.

4. When the inventory records of an aboveground tank show a significant loss or gain of pollutant and tank testing is required, the tank shall be emptied, cleaned, and visually and mechanically or electronically examined on the interior and bottom, or tested by other means approved by the department.

5. No person shall use or repair an aboveground

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1 tank which is leaking or which has leaked without:

- 2 a. containing the leak;
- 3 b. performing or having the repairs performed
- 4 in a manner which restores the structural integrity of the tank,
- 5 except that temporary repairs may be made to lesser standards and
- 6 may remain in place for up to six (6) months.

7 6. Any dike or impervious containment which shows
8 damage which could impair its ability to retain pollutants shall
9 be repaired.

10 (2) Underground Facilities

11 (a) All storage tanks.

12 1. Inventory records as required by subparagraph
13 17-61.05(4)(c)2. shall be maintained for all underground tanks in
14 a manner equivalent to that shown in API 1621, Appendices A, D,
15 and E, and shall include as a minimum:

- 16 a. pollutant type contained,
- 17 b. ~~daily~~ physical inventory,
- 18 c. inputs and outputs of pollutant,
- 19 d. amount of water in tank, and
- 20 e. reconciliation of the above.

21 2. Where a tank has pollutants added and withdrawn
22 for 24 hours per day, physical inventory shall be measured at
23 least every 24 hours.

24 (b) New storage tanks.

25 1. All new tanks installed for the underground
26 storage of pollutants shall be designed and constructed in a
27 manner which will prevent discharges of pollutant to the land,
28 groundwaters, or surface waters of the state. Acceptable designs
29 for tank construction include cathodically protected steel, glass
30 fiber-reinforced plastic, steel clad with glass fiber-reinforced
31 plastic, double-walled steel or plastic, or other equivalent

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1 design approved by the department. Design, construction and
2 installation of new underground tanks shall be in accordance with
3 standards contained in NFPA 30, Chapters 2-1 and 2-3, API 1615,
4 Chapters 3(3) and 3(4), and UL 58 or UL 1316, and manufacturers'
5 requirements. The design of double-walled tanks shall be
6 approved by the department on a case-by-case basis.

7 2. All new tanks shall be equipped with a strike
8 plate beneath the fill pipe and gauge opening.

9 3. All underground new tanks must be provided
10 with a means of monitoring for any leakage and spillage of the
11 stored pollutant at the time of installation. The monitoring
12 system may consist of:

13 a. a continuous leak detection system in
14 between the walls of a double-walled tank; or

15 b. a single monitoring well or detector located
16 in an impervious secondary containment; or

17 c. a continuously operating leak detection
18 system placed around a tank in an excavation or secondary
19 containment in accordance with the manufacturer's requirements;
20 or

21 d. a network of at least four monitoring wells
22 placed in the excavation around a tank or tanks in compliance
23 with the requirements of Section 17-61.05; or

24 e. a groundwater monitoring plan submitted to
25 and approved by the department for the pollutant storage facility
26 subsequent pursuant to Chapter 17-4.245; or

27 f. an approved Spill Prevention Control and
28 Cleanup Countermeasure plan for the pollutant storage facility
29 as required by 40 CFR Part 112, submitted to the department; or

30 g. another alternative approved by the
31 department.

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4. A cathodically protected tank shall meet the specifications in API 1632, be ~~sandblasted-at-least-to-SSPC-6-on-the-exterior-and~~ coated in accordance with NACE RP-01-69, and shall meet the following requirements.

a. A sacrificial anode-type tank shall: --
~~-----it-meet-the-requirements-of-NACE~~
 RP-01-69-as-a-minimum; and
~~-----it~~ be electrically isolated.

b. A tank protected by an impressed current system shall:

i. be designed so that the impressed current source cannot be de-energized at any time, including during closure of the facility, except during power failures or to perform service work on the storage system or the impressed current cathodic protection system; and

ii. include a continuously operating meter to show that the system is working.

5. A glass fiber-reinforced plastic tank shall:

a. be tested in accordance with ASTM Specification D4021-81; and

b. be ~~HB~~ labeled on the tank and fill cap "Non-metallic Underground Tank for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures", or "Non-metallic Underground Tank for Petroleum Products Only".

6. A glass fiber-reinforced plastic-clad steel tank shall as a minimum:

a. be cleaned by sandblasting to SSPC 6;

b. be clad with a mixture of isophthalic resin and fiberglass 100 mils thick;

c. be tested by a 10,000 volt holiday test performed over 100 percent of the surface; and

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 deletions from existing law.

d. be electrically isolated.

(c) Existing storage tanks.

~~-----17- No person shall substantially modify any
existing underground tank without complying with the
provisions of Section 17-61.06(2)(b)-----~~

2. 1. Commencing January 1, 1999, no person shall use, maintain, or fill any in-service existing underground storage system without retrofitting the system so as to comply with all of the provisions of 17-61.06(2)(b), except that:

a. strike plates are not required to be retrofitted; and

b. tanks which are other than the approved types must either be lined in accordance with the recommendations in API 1631, or replaced with an approved type tank. A tank which has been lined shall be tightness tested before being put into service.

3. 2. In achieving the above compliance, retrofitting shall be completed by December 31 of the appropriate year shown in the table below. If the age of the tank cannot be determined, retrofitting shall be completed by the earliest date shown.

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17-61 // Draft // 03-22-84

Year Tank Installed	Year Retrofitting Required							
	1985 ~~6~~	1986 ~~7~~	1987 ~~8~~	1988 ~~9~~	1989	1992	1995	1998
Prior to 1970	MO			<u>LR</u>	~~LR~~			
1970 - 1975		MO				LR		
1976 - 1980			MO				LR	
1981 - Sept. 1, 1984				MO				LR
MO = Installation of Monitoring ~~well~~ s <u>system</u> and devices and Overfill protection.								
LR = Lining or Replacement of Non-Approved-Type Tanks.								

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(d) Pollutant leaks, maintenance and repairs.

1. All underground tanks shall be maintained in the following manner.

a. A sacrificial anode type tank shall have the structure-to-soil potential tested six (6) weeks after installation or ~~excavation~~ construction in the area, and annually at the end of the first year, and every five (5) years thereafter. If the cathodic protection system is not operating in accordance with manufacturer's requirements, the cause shall be determined and the necessary repairs made within 60 days of the test.

b. An impressed current type tank shall be inspected monthly, and if the protective system is not operating in accordance with manufacturer's requirements, the cause shall be determined and the necessary repairs made within 60 days of the test.

c. A glass fiber reinforced tank shall be tested for deflection in accordance with manufacturer's requirements at the time of installation.

2. When an underground tank is found to be leaking, the tank must be emptied of all free liquid and meet the requirements of Section 17-61.05(4).

3. No person shall put back into service any underground tank which has leaked or has otherwise failed, for the purpose of reusing the facility, without:

a. containing the leak;

b. performing or having the repairs performed in a manner which restores the structural integrity of the tank or meets the specifications in API 1631; and

c. testing or having the tank tested.

4. Testing and inspection.

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a. All testing of underground tanks shall be done by the precision test of NFPA 329, Chapter 4-3.10 or other test of equivalent or superior accuracy.

b. Such tests shall be conducted by a person trained and certified by the manufacturer of the test equipment or his agent in the correct use of the necessary equipment, and shall be performed in accordance with the testing procedures and requirements of the test system manufacturer.

c. If for any reason testing required by this Chapter cannot be performed, the tank shall be deemed abandoned.

(3) Integral Piping Systems

(a) All systems.

1. All integral piping systems shall be installed, used, and maintained in a manner which will prevent the discharge of pollutants to the lands, groundwaters and surface waters of the state.

2. All integral piping systems shall be constructed in accordance with accepted engineering practices, and NFPA 30, Chapter 3.

3. All integral piping systems shall be designed, constructed and installed in a manner which will permit periodic testing of the entire system.

4. Each owner or operator of any integral piping system shall test the piping whenever the associated tank is tested. All tests shall be conducted in accordance with API 1110, or other equivalent methods approved by the department.

(b) Systems in contact with the ground.

1. New systems.

a. All integral piping systems shall:

i. be constructed of corrosion resistant materials; or

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1 ii. for metal integral piping systems be
2 protected against corrosion by the use of double-walled piping or
3 cathodic protection in accordance with API 1632, NACE RP-01-69,
4 or an equivalent system.

5 b. Cathodically protected piping systems of the
6 sacrificial anode type shall:

7 i. be designed and installed to permit
8 measurement of structure to soil potential, and be tested six (6)
9 weeks after installation or new-excavation construction in the
10 area, ~~and-annually at the end of the first year,~~ and every
11 five (5) years thereafter; and

12 ii. if inadequate cathodic protection is
13 indicated, the cause determined, and necessary repairs made to
14 meet manufacturer's requirements within 60 days of the test.

15 c. Cathodically protected integral piping
16 systems of the impressed current type shall:

17 i. be designed so that the impressed
18 current source cannot be de-energized at any time including
19 during closure of the facility, except during power failures or
20 to perform service work on the storage system or the impressed
21 current cathodic protection system; and

22 ii. be equipped with a continuously
23 operating meter to show that the system is working. The system
24 shall be inspected monthly, and if any test indicates that the
25 system is not functioning in accordance with manufacturer's
26 requirements, the cause shall be determined and the necessary
27 repairs made within 60 days of the test.

28 d. All integral piping systems shall be
29 equipped with a leak detection system which may consist of:

30 i. a network of monitoring wells; or

31 ii. a continuously operating leak detector

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1 in the excavation along the piping, between the walls of
 2 double-walled piping or in a secondary containment in which the
 3 piping lies; or

4 iii. a single monitoring well or detector in
 5 an impervious underground catchment basin where piping is
 6 installed so that all leaks will enter the basin; or

7 iv. a groundwater monitoring plan submitted
 8 to and approved by the department for the pollutant storage
 9 facility subsequent to Chapter 17-4.245; or

10 v. an approved Spill Prevention Control
 11 and ~~Cleanup~~ Countermeasure plan for the pollutant storage
 12 facility as required by 40 CFR 112, submitted to ~~and approved~~
 13 ~~by the department;~~ or

14 vi. another alternative approved by the
 15 department.

16 e. Where monitoring wells are used, they
 17 shall:

18 i. be installed in the excavation beside
 19 the integral piping system and shall be located along its entire
 20 length, with one well within 100 feet of each end of the
 21 excavation; and

22 ii. be located so that no two (2)
 23 consecutive wells are more than 250 feet apart.

24 2. Existing systems.

25 Commencing January 1, 1999, no person shall use
 26 or maintain any existing in-service integral piping system in
 27 association with any facility unless the existing system complies
 28 with all of the provisions of 17-61.06(3)(a) and (b)1. An
 29 integral piping system shall be retrofitted on the same schedule
 30 as the associated tank.

31 (c) Systems not in contact with the ground.

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1 All new and existing systems.

2 1. All integral piping systems shall be inspected
3 at least once a month for wetting, discoloration, blistering,
4 corrosion, cracks or other signs of surface or structural
5 damage.

6 2. Any integral piping system which shows signs of
7 ~~surface-or-structural~~ damage which could impair its ability
8 to retain pollutants shall, as soon as practicable, be drained of
9 sufficient contents to permit repair, and be repaired in a manner
10 which restores the structural integrity of the system.

11 3. Commencing January 1, 1990, no person shall use
12 or maintain any existing in-service integral piping system which
13 does not meet the requirements in 17-61.06(3)(a). An integral
14 piping system shall be retrofitted on the same schedule as the
15 associated tank.

16 (d) Product leaks and repairs.

17 1. When an integral piping system is found to be
18 leaking, the leak must be contained as soon as practicable or the
19 system must be drained of sufficient contents to prevent further
20 leakage and allow repair.

21 2. No person shall use or repair an integral piping
22 system which is leaking or which has leaked without:

23 a. containing the leak;

24 b. performing or having the repairs performed
25 in a manner which restores the structural integrity of the
26 storage system and is in accordance with accepted engineering
27 practices; and

28 c. testing the integral piping system.

29 Specific Authority: 376.303, F.S. Law Implemented: 376.303, F.S.

30 History: New
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deletions from existing law.

1 17-61.07 Financial Responsibility. (Reserved)

2
3 17-61.08 Approval of Alternative Procedures and
4 Requirements.

5 (1) The owner or operator of a facility subject to the
6 provisions of this Chapter may request in writing a determination
7 by the Secretary or his designee that any requirement of this
8 Chapter shall not apply to such facility, and shall request
9 approval of alternate procedures as requirements.

10 (2) The request shall set forth at a minimum the following
11 information:

12 (a) Specific facility for which an exception is
13 sought.

14 (b) The specific provision of Chapter 17-61 from which
15 an exception is sought. Any provisions which reference this
16 section are subject to the approval procedures set forth herein.

17 (c) The basis for the exception including, but not
18 limited to, the hardship which would result from compliance with
19 the established provision.

20 (d) The alternate procedure or requirement for which
21 approval is sought and a demonstration that the alternate
22 procedure or requirement provides a substantially equivalent
23 degree of protection for the lands, surface waters, or
24 groundwaters of the state as the established requirement.

25 (e) A demonstration that the alternate procedure or
26 requirement is at least as effective as the established procedure
27 or requirement.

28 (3) The Secretary or his designee shall specify by order
29 each alternate procedure or requirement approved for an
30 individual facility in accordance with this section or shall
31 issue an order denying the request for such approval. The

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1 department's order shall be final agency action, reviewable in
2 accordance with Section 120.57, Florida Statutes.

3 Specific Authority: 376.303, F.S. Law Implemented: 376.303, F.S.

4 History: New
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GRADUAL POLLUTION INSURANCE ON
UNDERGROUND PETROLEUM STORAGE TANKS

COMMENTS*
OF
THE PLANNING CORPORATION

BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

MARCH 1, 1984

*Extended to include additional material

INTRODUCTION

The Planning Corporation is an independent Insurance Agency specializing in the development of insurance programs for members of National Trade and Professional Associations.

We represent our clients, and not the insurance industry, and our normal approach is to determine the specific insurance needs of our Association clients and to then negotiate with several insurance companies to obtain the most advantageous policy terms and pricing.

Our Agency currently represents more than 150 insurance companies, including Underwriters at Lloyd's.

In 1982 we were asked by a National Petroleum Marketing Association to develop an insurance program that would cover losses resulting from gradual leaks occurring in underground petroleum storage tanks, primarily tanks located at retail gasoline stations.

In July 1982 we began offering gradual Pollution Liability Insurance to members of one National Petroleum Marketing Association, and subsequently expanded our offering to members of eleven additional National, Regional and State Petroleum Marketing Associations.

At this time our Agency is the major writer of gradual Pollution Insurance on underground petroleum storage tanks.

We currently write insurance on more than 6,200 retail gasoline stations nationwide, covering an average of four underground storage tanks at each location.

Since we began writing this class of insurance, we have responded to more than forty incidents involving loss of product from underground tanks. Most of these losses have been limited to minor clean-up at, or immediately adjacent to, the retail location, but a small number of losses have involved third party litigation requesting substantial monetary damages. In one instance a suit has been filed asking for 5.5 million dollars.

GENERAL LIABILITY INSURANCE

Nearly all petroleum marketers are covered by Comprehensive General Liability (CGL) policies.

Such policies cover bodily injury and property damage to others caused by the insured in the course of his business activities.

In the early 1970's, insurance companies became aware of the possibility of losses caused by gradual pollution and were concerned that such losses might manifest themselves long after a particular policy was no longer in force. To protect themselves against this type of loss, most standard General Liability policies were modified to include the following exclusion:

EXCLUSION
(Contamination or Pollution)

It is agreed that this insurance does not apply to bodily injury or property damage arising out of the discharge, dispersal, release or escape of smoke, vapors, soot, fumes, acids, alkalis, toxic chemicals, liquids or gases, waste materials or other irritants, contaminants or pollutants into or upon land, the atmosphere or any watercourse or body of water; but this exclusion does not apply if such discharge, dispersal, release or escape is sudden and accidental.

This means that General Liability policies will cover any pollution claim that results from a sudden and accidental occurrence, but would exclude the gradual leaks which typically occur in underground petroleum storage tanks.

Recently, a number of State courts have held that this exclusion wording is insufficient to deny a gradual loss, and the insurance industry is in the process of modifying the standard CGL exclusion to more precisely state their intent. The new exclusion wording, which is scheduled for adoption in 1985, reads as follows:

This insurance does not apply to:

- (1) The contamination of the environment by pollutants that are at any time introduced anywhere into or upon land, the atmosphere or any watercourse or body of water:
 - (a) Intentionally by or for you; or
 - (b) Through a gradual emission, discharge, release or escape from any source; or
- (2) Any "bodily injury" or "property damage" arising out of such contamination.

Gradual emissions include leaks; drips; seepages; oozing or leaching; and diffusion, infiltration or permeation.

Contamination includes any unclean, unsafe or unhealthful condition arising out of the presence in the environment of pollutants, whether permanent or transient.

The environment includes land, bodies of water, underground water or water table supplies, air and any other natural feature of the earth or its atmosphere, whether or not altered, developed or cultivated.

Pollutants include smoke; vapors; soot; fumes; acids; alkalis; chemicals, liquids or gases; thermal pollutants; and all other irritants or contaminants.

It is clear that, while the insurance industry is willing to provide insurance for sudden and accidental pollution losses, they do not wish to cover gradual pollution losses in the standard General Liability policy.

While a small number of insurance companies have shown a willingness to modify their General Liability policies to cover gradual pollution, a petroleum marketer usually must purchase a separate Pollution Liability policy in order to obtain insurance protection for gradual pollution losses.

POLLUTION LIABILITY INSURANCE

At this time, a limited number of insurance companies write Pollution Liability policies designed specifically to cover gradual pollution, and only a small percentage of these companies are willing to offer such coverage to petroleum marketers.

Therefore, while gradual pollution insurance is available, petroleum marketers can initially expect coverage to be both difficult to obtain, and expensive to purchase.

Once a sufficient volume of pollution insurance is written on petroleum marketers, premiums can be expected to stabilize to reflect actual loss experience. However, at this time, and for the foreseeable future, premiums will be arbitrarily established, and will not be consistent from one insurance company to another.

POLLUTION POLICY EXCLUSIONS

There are certain exposures that insurance companies writing Pollution Liability Insurance either cannot, or will not, cover.

These areas usually include the following:

1. Fines or penalties;
2. Prior occurrences, or pollution known to exist at the time coverage is purchased;
3. Environmental impairment caused by willful violation of any ordinance or noncompliance with any governmental regulation, statute or instruction.

Additionally, any liability under "Superfund" which is apportioned against firms regardless of individual responsibility, would normally be considered uninsurable.

We are attaching a copy of two typical Pollution Liability policies which describe both what is covered and what is excluded.

If a financial responsibility requirement is included in any proposed legislation, it would be worthwhile to consider working with representatives of the insurance industry to make certain that any coverage mandated by law can actually be obtained.

UNDERWRITING REQUIREMENTS

Insurance companies writing gradual pollution insurance on underground petroleum storage tanks will base their rating and underwriting acceptance on several factors.

The most important will be:

1. Tank ages
2. Tank construction
3. Geographic location of the storage site
4. Proximity of the storage site to housing or other development
5. Proximity to navigable waterways
6. Existence of Inventory Control
7. History of prior losses

Based on the response to such questions in an application for insurance, an insurance company might issue coverage at standard rates, add a rating surcharge or decline to issue coverage.

While all of the above listed criteria can be of importance to an insurance company, three of these underwriting factors are of primary importance, and require additional comment.

Tank Ages

A large percentage of existing underground petroleum storage tanks are "unprotected steel tanks", and many of these tanks were installed during the 1950's and 1960's.

Depending on the corrosive properties of the surrounding soil, a percentage of these tanks can be expected to develop leaks brought about by gradual corrosion of the tank.

Assuming that the cost of immediate replacement of all tanks that have reached a certain age is prohibitive, especially for the smaller owner/operator, some method must be available to enable a petroleum marketer to closely monitor any loss of product.

An insurance company providing coverage will require that some system of tank monitoring be in place.

Tank Testing

A number of tank tightness tests have been developed which propose to be able to detect leaks in underground storage tanks in the area of .05 gallons per hour.

While these tests can be an important tool for the purpose of confirming a suspected leak, they have major shortcomings when relied on as a primary method of loss control.

First, the technology of tank tightness testing has not reached a sufficient degree of accuracy to be relied upon as a dependable method of leak detection. An underground tank and its contents reacts to changes in the environment. These changes may be brought on by ground reaction, vibration, pressure changes, internal or external, shock loads, temperature changes and thermal expansion. The results of a number of available tests performed on a variety of tanks with and without simulated leaks, have shown a disturbingly high degree of inconsistency.

Second, the number of personnel currently qualified to perform the available tests with any degree of accuracy is very small. While the number of qualified testers can be expected to increase, there is no foreseeable point at which a sufficient number would be available to test all of the existing underground storage tanks over any reasonable period of time.

Third, and equally important, a tank tightness test is like a train ticket; good for one day and one day only. A tightness test can be performed which indicates that the tank is not leaking, and the tank can begin leaking the next day.

In summary, tank tightness testing has a place as a diagnostic tool when a leak is suspected, but it is an extremely poor method of monitoring tanks on a regular basis for the purpose of detecting leaks within a reasonable period after the the leak begins.

CONCLUSION

If insurance becomes mandatory, the insurance industry does have policies available and will be able to handle the resulting volume of business.

Firms covered by the legislation will be able to insure their gradual pollution liability either by obtaining an endorsement to their existing Liability coverage or by purchasing a separate Pollution Liability policy.

However, only a limited number of insurance companies will initially be willing to offer coverage, and individual firms seeking coverage may experience difficulty locating such insurance companies.

Premium rates and underwriting requirements will vary considerably from insurance company to insurance company, and from risk to risk.

Several underwriting factors will be considered by insurance companies offering coverage, but the existence of daily inventory control will be the one essential factor that determines whether a firm with underground petroleum tanks can obtain insurance protection at all.

GROUND WATER CONTAMINATION

FRIDAY, MARCH 9, 1984

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON TOXIC SUBSTANCES
AND ENVIRONMENTAL OVERSIGHT,
Washington, D.C.

The subcommittee met at 2 p.m., in room SD-406, Dirksen Senate Office Building, Hon. Dave Durenberger (chairman) presiding.

Present: Senator Durenberger.

OPENING STATEMENT OF HON. DAVE DURENBERGER, U.S. SENATOR FROM THE STATE OF MINNESOTA

Senator DURENBERGER. The hearing will come to order.

We welcome all of you to the second hearing on the subject of leaking underground storage tanks. At the first session, on March 1, we heard from a diverse group of individuals interested in addressing this problem, including trade groups, State and county representatives, and authorities on hydrologic, technical, and liability aspects of storage tank leaks.

Today, we will hear from the Deputy Administrator of the Environmental Protection Agency as to what the Agency is presently doing to address the problem and the future direction of those efforts. It was at a hearing held on November 29 by the Subcommittee on Toxic Substances and Environmental Oversight on the topic of ground water contamination that the Agency identified leaking underground storage tanks as a suspected major source of contamination. We are aware that since that time the Agency has been expending considerable effort in this area. I am eager to hear of their progress and plans to address existing and potential tank leakage problems.

I have recently introduced a bill which reflects my own and other Members' perception of the need to take timely action to reduce the health and environmental risks from storage tank leakage into ground water. The bill embodies a flexible, State-oriented approach to prevention, detection and correction of leaks in recognition of the site-specific and variable nature of this problem.

It is my hope that a number of questions will be answered today that will add to our knowledge of administrative issues related to tank leakage control and the management options the Agency is now considering to diminish the potential for widespread contamination of ground water from this pervasive source.

(437)

Al, we appreciate your being here today and I understand how you couldn't make it last week. I am sorry we had to move this from yesterday morning but we were trying to raise taxes yesterday morning.

I appreciate Mr. Al Alm, Deputy Administrator of the Environmental Protection Agency being with us today.

STATEMENT OF AL ALM, DEPUTY ADMINISTRATOR, ENVIRONMENTAL PROTECTION AGENCY, ACCOMPANIED BY JAMES BARNES, GENERAL COUNSEL AND MARTIN HALPER, DIRECTOR, EXPOSURE EVALUATION DIVISION

Mr. ALM. Mr. Chairman, I am delighted to be here today. I would like to introduce my colleagues who are accompanying me to this hearing. On my near left is Jim Barnes who is the General Counsel of EPA, on my far left is Martin Halper who is the Director of the Exposure Evaluation Division.

I am pleased to participate in this hearing on underground storage tanks both to apprise the subcommittee of EPA's progress in addressing the problem and to learn more about the subcommittee's views. As you are well aware, ground water contamination has become a major concern to EPA as well as to the general public during the past few years. Last June the Administrator established a ground water task force to identify the areas of inconsistency among State, local and Federal programs, assess the need for greater program coordination within EPA, and examine the means available to EPA to strengthen the capabilities of the States to protect ground water resources. After months of discussion that involved nearly every office in the Agency, the regions, and many interested outside parties, the elements of a strategy began to emerge.

EPA is currently circulating its draft ground water protection strategy for comment. The main elements include providing support from existing grant funds for State program development, establishing a framework for decisionmaking in EPA programs, and establishing an Office of Ground Water Protection within the Office of Water at EPA to provide a focus for EPA action affecting ground water. The final element is to assess and determine the need for future regulation of currently unregulated threats to ground water such as landfills, surface impoundments containing nonhazardous wastes, and leaking storage tanks. I understand that the subcommittee has invited EPA to discuss ground water protection in general at a separate hearing next month, but it is important to set out our ideas about leaking storage tanks in the context of the broader work that the Agency has been doing.

Our current information on underground storage tanks is incomplete and anecdotal but it suggests there are between 1.4 million and 2 million active gasoline tanks. Many more hold other chemicals and still others are abandoned. These tanks are in every part of the country, owned by large and small businesses, individuals, and all levels of the government. An estimated 15 to 20 percent of the gasoline tanks are owned by the major petroleum companies. How many of these tanks may be leaking or will eventually leak or what environmental problems may be caused thereby is entirely

speculative at this point. We just have no means of making estimates at this time of sufficient reliability to use in national decisionmaking.

EPA believes that it needs a great deal more information in order to make reasoned management decisions. We have statutory authority to gather the necessary information and we intend to share our knowledge as it develops. We are not ready to undertake a comprehensive regulatory program, nor to comment upon the proposals of others until we better understand the dimensions of the problem.

As a first step, the Agency has already begun gathering more information about leaking storage tanks. We are not aware of any central repository for information. Neither the States nor the petroleum industry know precisely how many gasoline tanks there are in the country, what they are made of, how old they are, or how many are leaking. Nor is there agreement about what causes tanks to leak, how to test for leaks, or how to prevent them from leaking. There is little information from which to estimate the extent of pollution caused by leaking tanks.

EPA has begun to collect opinions on some of these issues by talking to experts such as those you have heard from last week; namely, the States, tank manufacturers and testers, oil industry representatives, and other knowledgeable and concerned parties. The information EPA is collecting falls into two categories: that which defines the nature and extent of the problem and that which identifies control options.

Among other things, EPA is interested in: the number of gasoline storage tanks now in use and the volumes of material delivered to and stored in the tanks; State and local government data on contamination of ground water by gasoline and other petroleum products; factors contributing to tank and pipe leaks; methods of testing tanks; types of tanks available and their compatibility with the products they store and the soils in which they are located; costs and effectiveness of various control options for tank repair, replacement, and secondary containment; current State laws, regulations, and local ordinances and their effectiveness; and control measures currently used by the major oil companies.

We expect this information to be collected and analyzed this spring. It will provide the basis for subsequent information dissemination, field surveys, and further action that may be appropriate. And of course, our actions will be consistent with the Paperwork Reduction Act.

One of our goals in collecting this type of information is to share it. The Office of Toxic Substances will immediately write a "chemical advisory," informing all owners of gasoline tanks of the potential for leaks and their possible legal liability for contamination of ground water. The chemical advisory will also contain technical advice on how to generate and use inventory records to detect leaks, how to perform certain tests, and ways of preventing leaks. The tank owners will be advised to voluntarily report leaks to appropriate State and local authorities and to EPA. Many gasoline tank owners and operators are not aware of leaks, their consequences, or the solutions to this problem. EPA believes that education, along with the incentive of reducing losses from leaks, will

have a positive impact. The Agency expects to have the chemical advisory ready for distribution in early summer.

There is a limit to the value of information collected informally. Therefore, EPA is planning a more rigorous process to collect information from which it can predict the true dimensions of the leaking storage tank problem and the reasons for it. Based upon the information already collected, the Agency plans to design a survey instrument and choose a small but representative sample of gasoline tanks to inspect. After the survey has been reviewed and approved, it would take about 14 months to test and inspect 500 or so tanks. We will then have a much better idea of how many tanks are actually leaking and how the factors of tank type, age, soil type, et cetera, contribute to the propensity for leaks.

As I have mentioned, the Agency does not yet have sufficient information to determine whether or what type of regulatory program would be necessary and/or effective, but we are proceeding to identify possible actions to consider in conjunction with the survey results as part of our eventual decision process.

Possible actions identified so far involve testing tanks periodically, notification to public bodies, and remedial action. They also include developing design and installation standards for new, retrofitted, and repaired tanks, and using existing EPA authority to require cleanup of leaks. A monitoring and inspection rule, for example, might require gasoline station owners and operators to maintain daily inventory records for each storage tank and pumping facility. The owner would then investigate the cause of any deficit indicated by the inventory.

If it could not be traced to factors other than leakage, such as theft, short deliveries or inaccurate meters, the tank owner would be required to test the tank and be advised to remove a leaking tank from service, repair and retest it, or replace it within a certain period of time. The owner would report the inventory analysis, the outcome of the tank test, and corrective action taken to local and State authorities and possibly to EPA. Of course, we would need to complete our evaluations of the nature and scope of the problem and to examine costs and potential effectiveness of a variety of courses of action before we could advocate any specific regulatory action at the national level.

Let me now turn to prevention of future leaks. The Agency already has standards for the design, installation, and maintenance of two categories of tanks, and is in the process of developing others. The Clean Water Act spill prevention plans require the owners of very large underground tanks that would threaten navigable waters or adjoining shorelines to take certain measures to prevent corrosion and to test them periodically for leaks. EPA also has standards for underground hazardous waste storage tanks that can be entered for inspection. The Office of Solid Waste and Emergency Response is expanding those regulations to include standards suitable for all tanks in which hazardous wastes are stored.

National design standards for all other new storage tanks and piping is another option under consideration. Once EPA is confident that it understands the science and technology involved, it would consider the development of tank design standards, performance standards, and installation procedures.

Finally, EPA statutes contain authority to order cleanup of soil and ground water. The Agency will use its emergency authorities, where appropriate, to protect against imminent and substantial hazards.

The Resource Conservation and Recovery Act and the Comprehensive Environmental Response Compensation and Liability Act give the Administrator authority to issue administrative orders as well as file civil suits in order to prevent imminent and substantial endangerment to public health and the environment. RCRA section 7003 authorizes the Administrator to bring suit to restrain any storage, transportation, or disposal of solid or hazardous waste. Because any material that leaks from a tank would be considered a waste, the scope of the RCRA provision is very broad. The Superfund coverage is also broad except that it does not extend to releases of petroleum products.

The Safe Drinking Water Act can be used to insure that contaminants of any kind entering public water systems do not present imminent and substantial endangerment to human health. This authority extends to public water systems serving at least 25 individuals or with 15 service connections. The Safe Drinking Water Act authorizes EPA to act only where appropriate state and local authorities have not.

Section 7 of Toxic Substances Control Act allows the Administrator to file a suit to seize an imminently hazardous chemical or mixture and to obtain court ordered relief to protect health and the environment from an unreasonable risk posed by distributing the chemical in commerce, using it, or disposing of it. Under this authority, for example, the Administrator could request a court to order that a leaking tank be drained and removed from service.

Thus, we feel that we are in a position to abate imminent threats and to protect the public from any hazards that may arise while we are studying the problem and alternative solutions.

Finally, Mr. Chairman, we believe that we have adequate authority under existing statutes to collect information, define the scope of the problem, and assess the options. Control options need to be preceded by much research, analysis, and discussions with industry and with state and local officials as to the causes, effects, costs, and relative responsibilities. We can deal with any emergency that may arise during research and analysis phase. We do not believe that any new legislation is necessary at this time because it should be based upon a better technical grasp of the problem and a more refined idea of what needs to be done about it. As we move ahead, we look forward to working with interested parties on this issue.

I will be glad to answer any questions for the subcommittee.

Senator DURENBERGER. That sounds like the acid rain speech, especially the last paragraph. One part of me says, isn't it great that you have a nice thoughtful organization, EPA, they don't rush the judgment on anything, and another part that says I should be patient and what I will do is explore various of these elements of what we have and what we don't have. I am sure no one will say we ought to be legislating for the sake of legislating but having been in the middle of the hearing on polychlorinated biphenol, I didn't know what PCB was until Florida did something about it

and then I found out that was something other States were doing something about and we were sitting on our duff doing nothing.

At our last hearing, courtesy of the American Petroleum Institute, we had a great schematic of what States were doing and where ordinances were required and permits were required and it looks to me a number of States are starting to wake up to the problem and a number of communities are starting to do something about it. I guess I always assumed that water is a resource that is practically everywhere and the storage tank is a manmade resource that is everywhere and that maybe as a nation it would be appropriate for us to undertake some kind of an activity beyond information-gathering that discharges our national responsibility to protect vital resources, in this case ground water.

I guess I feel strongly about it because everybody assumes that I represent not only 4 million constituents but 15,000 lakes and that we have water coming out of our ears in Minnesota. I suppose technically it is correct that there is an awful lot of water in that State but there is less and less and less consumable water in that State and we are in a tough shape with that kind of resource and you can imagine what the rest of the country is facing.

We are talking about protecting a vital resource here, ground water, that is extremely difficult to retrieve once contaminated. The consequences of storage tank leakage are unacceptable and so we have to see whether a wait-and-see attitude is appropriate or whether the bill that several of us put in is not some kind of a starting place for us to marshal a National effort utilizing the State and local governments.

Let me deal with some of the information that we appear to have already, some of which you confirmed and I will ask you to reconfirm. There are somewhere in the neighborhood of 2 million gasoline storage tanks out there, aren't there, across this country?

Mr. ALM. There are varying estimates. My testimony indicated 1.4 to 2 million. I have heard the estimate as high as 2.5 million. I think any of those estimates are probably good enough for this point in time.

Senator DURENBERGER. I think what we heard last week was that the oil and gas people only own about half the tanks that are out there, so there could be maybe as many as 4 million altogether if we think of all the chemical storage facilities.

Mr. ALM. There easily could be. My understanding is that gasoline tanks in service stations are about 40 percent of the total. The facilities owned by major oil companies are somewhere in the neighborhood of 15 to 20 percent of the total. If one goes beyond that to the wide universe of chemical storage tanks, you have virtually an unknowable number of tanks.

Senator DURENBERGER. We don't have to know the number. Once you have 2 million then you know a lot of them are leaking.

Mr. ALM. Knowing the total number is not the critical piece of information one needs.

Senator DURENBERGER. Does your information also indicate that something approximating 90 percent of the tanks out there are bare steel without any corrosion protection?

Mr. ALM. My understanding is 90 percent are bare steel.

Senator DURENBERGER. And the expected "safe" life span of an unprotected tank ranges from 7 to 25 years?

Mr. ALM. That is correct. Obviously it depends on soil condition and the like. Some tanks wouldn't be subject to the same amount of corrosion, some would have much shorter lives before they leak.

Senator DURENBERGER. And a majority of the tanks now in the ground are thought to be more than 15 years of age.

Mr. ALM. I have seen two figures in there, so I will give you both of them. One figure I saw was that a third of them are 16 years or over.

Senator DURENBERGER. Thirty?

Mr. ALM. Thirty percent are 16 years. Another estimate I heard orally was 50 percent of them. This represents tremendous gaps in knowledge. We simply don't have a good handle on how many there are, how many of them are leaking, under what conditions are they leaking and these are the kinds of questions that we feel we need some answers to.

Senator DURENBERGER. You are not saying we ought to go out and find every tank in America before we do anything?

Mr. ALM. No, Senator, that would last more than my lifetime. We are proposing a survey of approximately 500 tanks which would be a statistically significant sample.

Senator DURENBERGER. Let me ask you about one other figure that I hope wasn't a hypothetical. You have the technical expertise to tell me if I am wrong, that a leak the size of 1 gallon of gasoline per day is sufficient to pollute the water of a 50,000 person community to a level of 100 parts per billion.

Mr. ALM. I asked about that very figure and I am told that could be correct. I have to have a lot of assumptions where it is leaking, what the dispersion rate of the oil is and the like. That could happen.

Senator DURENBERGER. You have indicated that the Agency right now does not plan any specific preventive actions but will concentrate your efforts on information gathering and also responding to leaks. Is that your statement?

Mr. ALM. We are basically planning three things: First, the chemical advisory, which we would like to get out in July. We believe that a chemical advisory which indicated the liability the gasoline stations face with leaking tanks and technical information about how to test them and how to clean up and deal with the problem will do a lot of good.

Second, as I indicated, we will begin the survey. The survey will look at 550 stations to give us a lot of the information.

Third, we are looking at a number of regulatory options, including establishing standards for new tanks and replacement tanks, an inspection and testing regulatory possibility, and a system of notifying the State and EPA of leaks.

So basically what we are trying to do is to collect the information, the physical information on the dimensions of the problem and, second, look at the regulatory options as we move ahead with the thought that if we have a problem that is clearly definable, that we would take appropriate regulatory action.

I might add a couple of observations on your comments. First of all, I would like to congratulate you for your leadership on this

issue; I think it is an important problem. EPA did identify leakage of underground storage tanks as one of the issues that had to be faced more forthrightly as part of the ground water strategy program. We have done a lot of work. We have redirected resources, we have given this issue a great deal of priority. I have personally spent a large portion of my time on the issue. I wish I could tell you that we have all the information and could point very clearly to the direction the country ought to go in. But, very honestly, I cannot, when I look at the magnitude of the problem and EPA's general capabilities. We have never tackled a regulatory problem encompassing 2 million or so potential regulated parties. Even small requirements in a system that large can result in potentially high costs. For example, if every tank had to be inspected using current inspection technology, the cost would be \$3 billion a year. It is for this reason that we have been cautious to try to do our homework. We are very concerned that if we don't do our homework that we may lurch out in a way that will be counterproductive in the long run.

Senator DURENBERGER. I understand that, and that was the compliment I tried to give you in the beginning where one part of me says it is really great to have somebody that thinks these things out before they leap, but I guess what I am trying to do in the course of this exchange will be to develop what we know, what we don't have, what deals we have and what deals we don't have and be sure as we go through the process we don't fool anybody out there about the fact that this really isn't the acid rain problem.

With regard to acid rain—and I won't put words in EPA's mouth—there are folks in this administration that would like to see the problem go away because they think that liming a few lakes will take care of the problem. I don't happen to believe that you or the Administrator or a lot of people at EPA come from that direction and probably you see a value in that area as you see a value in this area in formulating a national policy around a piece of legislation that may not require national government to dictate a certain kind of a tank every place in this country, and hopefully that is not what we are going to do.

The first point that we got to get across to the Deputy Administrator is that there are some information gaps in the system but there are also some rather serious gaps in current authority to do something about it and that maybe some of those gaps could be filled out counting all 500 tanks or whatever that at least there might be some encouragement for a process that starts now and may end up a year from now with a piece of national legislation.

Let me first address the regulation part of this process. I tried to reread pages 7 and 8 of your statement and it keeps coming out that your testimony says you already have all the authority you need to respond to leaking tanks. But that is not the right way to read it, is it?

Mr. ALM. Mr. Chairman, what I was saying in this testimony is where we are right now; we have adequate authority to develop the survey; we would have adequate authority, for example, to begin the regulatory process under section 6 of TSCA. Whether ultimately as we learn more about the problem the current authority is the perfect match or not I cannot say at this time. It could be that, as

we learn more about the problem, additional authority would be necessary.

The problem with enacting legislation right now is we feel that we don't really understand precisely what kind of legislation would be most appropriate.

Senator DURENBERGER. I am just trying to deal first with what you can and what you can't regulate. Would any of the regulations or standards you intend to promulgate use the typical tank used to store gasoline in the filling stations?

Mr. ALM. That is correct. Section 6 of TSCA—I am going to start practicing law now—under section 6 of TSCA we have the authority to regulate leaking underground storage tanks with a couple of limitations. One is, section 6 is restricted to commercial activities. Now, we believe that commercial activities would include, if one wanted to, certain agricultural activities; it may well include State and local government subdivisions. The limitation of the commercial activity has some meaning, some limitation of authority. But we do feel that under section 6 we have the authority to establish both design standards, if they are deemed desirable, and an inspection, testing, and notification rule.

Senator DURENBERGER. But first under section 6 don't you have to make a hazard finding?

Mr. ALM. There is an unreasonable risk test in TSCA. We believe that considering the cost involved that that is not an onerous test. One would raise the question, would we even regulate if we didn't consider the risk unreasonable?

Senator DURENBERGER. But you got to make a specific finding?

Mr. ALM. Yes.

Senator DURENBERGER. Another problem in connection with the commercial activity that you raised that bothers me is, again—and this may be the way I am reading section 6—it seems to me it is somewhat difficult under TSCA to delegate authority to the State.

Mr. ALM. TSCA has no explicit delegation authority, but in fact we have used a grant program to allow the States to enforce, for example, our PCB rule, and that has worked perfectly well even without the formal delegation mechanism like those in the Clean Air Act and the Clean Water Act.

Senator DURENBERGER. So you think you have the authority, then?

Mr. ALM. We do not have the authority to formally delegate as we do, say, in the Clean Water Act. However, believe, for example, that one could choose to have a notice requirement, that the notice of the leak would have to go to State governments. In a sense, that is a de facto delegation they would be getting the information, they would be able to do something with that information.

What you don't have is a formal delegation process where a State would come in to EPA and have to meet certain statutory requirements. But we found that with TSCA we have been able to create de facto delegation in enforcing our rules, for example.

Senator DURENBERGER. Is that the only one you can think of? Can you name some existing Federal/State partnerships under TSCA that you feel good about?

Mr. ALM. We have a grant program of \$500,000 a year and that has been used for the PCB rule.

Mr. HALPER. Specifically some studies have been done by Maryland and Maine on gasoline tanks. The Maryland work, which is now leading to a regulation, was paid for by EPA through section 28.

Senator DURENBERGER. Would you contemplate giving some moneys to have them actually implement a program?

Mr. ALM. We could not force them to implement a program like you can under the Clean Water Act.

Senator DURENBERGER. Or under my bill.

How about money, do you have adequate funds to implement these regulations?

Mr. ALM. We have not developed any requirements.

Senator DURENBERGER. If you develop them?

Mr. ALM. Again we are talking about a hypothetical outcome. I do not know what would come out of our review. Hypothetically, if we determined there was a regulatory requirement, we could, obviously, then have to make a choice whether we wanted a formal delegation authority in the statute. In case we would have to ask for new authority but an alternative to that would be to create a system where we could put out regulations and provide grant funds. Again, I am speaking purely hypothetically because we are talking about decisions that have to be made sometime in the future.

Senator DURENBERGER. You also state once a substance leaks from an underground tank it is a waste and, therefore, within the ambit of RCRA. This is a novel interpretation of the law because it means it would give EPA jurisdiction over practically every spill in the United States. Overturned tank cars would be regulated under RCRA, as would explosions at chemical plants, spills of oil on the high seas, all kinds of things, is that correct?

Mr. ALM. If there is imminent and substantial endangerment RCRA authority can be used to require clean up and indeed in the case of Canob Park, one that I know about personally, that authority was used and the Exxon and Mobile Corp. were required to provide bottled water and to provide a new water system to the community. Also section 3008 of RCRA could be used with a less onerous statutory test than imminent and substantial endangerment. Under section 3008 EPA would first be required to establish by rule that leakage from a tank represents a hazardous waste for that purpose. Therefore, if there were leakage the owner of the tank would be required to get a permit, but in a catch-22 situation they couldn't get the permit until they stopped the leak. So although the authority sounds a bit bizzare, it could be effective in dealing with leaks.

Senator DURENBERGER. But being a realist, just the two of us, are you really citing RCRA as the source of an authority you would like to apply to a problem you are not sure you know the dimensions of but it is 2 to 4 million tanks and 90 percent of them bare steel, et cetera, et cetera, et cetera. Can't we do better than RCRA to handle that problem?

Mr. ALM. It may not be the ultimate authority but it can be used right now while we assess precisely where we would like to go. Also, you are aware that the Safe Drinking Water Act can be used

in situations where the discharges create again an imminent and substantial endangerment to health.

Senator DURENBERGER. Under 3008, is it possible that you have authority to prescribe double liners on tanks and all the other kinds of preventive measures?

Mr. ALM. I am going to turn to my general counsel, but I will make one observation. We believe that authority will be available under Tosca and when I indicated that one of the regulatory possibilities we are considering would be the establishment of tank standards, these tank standards might well require double lining or cathodic protection. I have not explored whether RCRA would provide the same authority.

Mr. BARNES. I think, Mr. Chairman, that we would be able to establish standards for underground storage tanks under section 3004. Again, as a predicate, we both recognize that RCRA really wasn't set up with a view toward regulating product storage, it was aimed at storage of hazardous waste or disposal of hazardous waste. To regulate product storage under RCRA, we have to go through the back door because a product stored in a tank doesn't meet our definition of hazardous waste unless it leaks. For this reason, I think we should get back to regulating product storage tanks through the front door under more suitable authority.

Senator DURENBERGER. It is pretty clear we can't use Superfund to get at gasoline or production, right?

Mr. ALM. The Superfund law precluded petroleum products unless the Agency designated it specifically as a hazardous substance and that has not been done to date.

Senator DURENBERGER. Do you have any idea how many releases of gasoline from underground tanks the Agency has responded to as imminent hazards under the Safe Drinking Water Act or the other statutes you have mentioned?

Mr. ALM. I can provide that to you.

Senator DURENBERGER. If you would elaborate on that and indicate for us how many of those leaks involved leaks from a tank into ground water.

Mr. ALM. I will be happy to provide that.

Senator DURENBERGER. Has any office been put on notice that they are to respond to these leaks in addition to their other duties?

Mr. ALM. We are in the process now, as you know, Mr. Chairman, of establishing regional counterparts to the Office of Ground Water Protection. I would suspect, although we have not faced up to this, that one of their responsibilities will be to deal with underground storage tank problems. These problems have been observed in at least a majority of our regions, so it is something that the Agency already is quite sensitive to. Our regional administrators are required to prepare an environmental management report and those reports are designed to lay out the environmental problems in the regions. My recollection is about six of the regions indicated this was a problem and it is obviously something they have to address.

Senator DURENBERGER. Do you have any plans to reprogram resources to dedicate them to searching out and building imminent hazard cases against leaking tanks?

Mr. ALM. We don't have anything specifically programed for that. I have asked the Agency, in establishing their regional counterparts to the Office of Ground Water Protection, to come in to me with resource estimates, and I suspect that we will.

Senator DURENBERGER. I wonder—I always hate to get into this part of it, it drives me crazy but maybe you on your counsel can tell us for the record the regulatory process again starting with the notice of intent and carrying this all the way through a time line about how long it takes to issue a regulation and then what options people have and the appeals and all that sort of thing in this area that we are concerned about here today.

Mr. ALM. You would like that for the record?

Senator DURENBERGER. Maybe you ought to do it for the record. Give me one of those worst case scenario things and then I will be satisfied for 4 years, 5 years.

Mr. BARNES. The worst case probably involves us starting out with advance notice of proposed rulemaking where we generally solicit information. Based on that we go to the next stage which would be a notice of proposed rulemaking which we would put out for public comment. For a topic like we have here, we might want to provide 60 to 90 days for interested parties to provide their comments. Following that, the Agency would need to analyze those comments preparatory to developing a final rule. The final rule could take a considerable period of time if we end up with a lot of complex interrelated comments or if we didn't start off with as good a technical base as we hoped and we have to develop additional information. We may even have to repropose the rule after we get a better handle on it.

I think it would be fair to say that the more prepared we are going into that initial proposed rule making so we are fairly sure of the dimensions of the problems we are addressing, the probable scope of the different alternatives that ought to be put before the public for comment and the more substantial a technical basis we have for our proposal, the more likely we are to have the process move smoothly between the proposed stage and the final stage, and similarly to be fairly defensible once the Agency finally takes action.

Senator DURENBERGER. I can track with all of that. It keeps getting back to one of the reasons that I am apprehensive about this process. We are going into a new area. The universe is like looking up at stars except it is underground and you can't see it, even on a clear night you can't see them and there are 2 million out there. If you thought regulating was simple, it took a long time. It seems to me coming down the pike with information gathering and looking for science and technology and trying to stretch law requires use of regulatory process. It is a signal to the folks out there that it was practical for us to come along and solve this problem. Whereas if there was at least a piece of framework legislation that we don't all start pulling together on the same toes as this one. It could be years from now we are going to have a law not a regulation and I wonder if that might not stimulate a lot more information and a lot more positive help in getting us to come up with something on this approach that you have chosen to follow.

Mr. ALM. I would like to answer. It reminds me of a story of a friend of mine on the Federal Power Commission and on his first day on the job he was given his first case and it was a small hydroelectric project that had been around for 30 years and my friends sarcastically said: Have you had enough time to deal with this problem? And the young man said: You are right, we will take another look at it.

Senator DURENBERGER. You just made my case.

Mr. ALM. I wasn't making your case. I was indicating that sometimes regulation is a long process. The problem is that new legislation doesn't necessarily solve the problem. Any new bill, unless you would suspend the APA provisions, would go through the same kind of process. We have found with all new legislation that it has taken us much much longer to implement than we would like. The process of regulation is a deliberative process.

Senator DURENBERGER. But so is the process of legislating. Suppose we both agree this is a political year, there is an election, there is a horrible deficit, and antiregulatory feeling in the land and it probably won't get it this year but we might get it done next year so at least the process has started by which the public that is interested in this, including a lot of tank owners who are concerned: What should I do? Let's put the best face that a lot of people who know they have problems don't know how to rectify the problem because there isn't a local ordinance in and there are a lot of good folks in the tank business that would like to get clear direction. If they have to look at a 3-year process in which somebody who is well healed and got a bunch of corroding tanks but more money and lobbyists and can hold this process, might we not pull a lot of this information together much more quickly and a lot of the suggestion about how we go about it much more quickly if people thought there was a piece of national legislation coming down the line within a year, a year and a half?

Mr. ALM. I think you are right. It is important to get the word out quickly about the problem. The schedule that I mentioned to you would be that we have a chemical advisory by about July, it would be written between March and July. I mentioned to you the fact we are looking at these regulatory initiatives. We could, if they are developed, make them public in a form for comment whether in an ANPR or whatever, sometime in the fall of 1984.

I share the frustration you do, Senator, about how long it takes to get things done and I can assure you that EPA staff sometimes feels that I am always pushing and pushing very hard but I have looked very carefully into what we know and what has to be done. I am personally convinced we have to adopt a schedule that gets the job done right and getting the job done right would mean that we are not ready to have a regulation out this year, it is going to take us more time to develop. I wish things would move faster but I am incapable of waving a wand and making them happen faster than they can.

Senator DURENBERGER. Don't get me wrong, I understand that. I see this as a partnership effort. Regardless of what kind of legislation we were to jointly pass that there would probably be some regulations contemplated within that. I am just bothered today by the signals we are sending out there to all kinds of people that they

just don't have to worry about this process for a long time because it isn't a bunch of Senators and Congressmen getting together and saying this is the law of the land, it is EPA going into the regulation process, you can beat that.

Mr. ALM. I think your focusing on the issue as you have is very helpful. We have indicated this is a priority area in our ground water strategy. That strategy will be public in the spring of this year and we hope to widely disseminate it. So we will be sending out a signal this spring about our concern about this problem. The chemical advisory will be the next step and in 1985 we will be in a position of talking about regulatory alternatives in the public sense.

Senator DURENBERGER. Do you intend to issue an advance notice of intent to propose a tank regulation at some later time?

Mr. ALM. We have not completely settled on that issue but that is one possibility.

Senator DURENBERGER. Using the approach you have described, can you make an estimate how long it would take to get abatement regulations for existing tanks on the books?

Mr. ALM. If you put out an ANPR in the fall of 1984 give people 90 days to comment, you would have to digest those comments, and develop a regulation. Any proposed rulemaking wouldn't occur until mid-1985, somewhere in that range. So, between the introduction of an ANPR and a notice of proposed rulemaking, you would have a year in total.

Senator DURENBERGER. One year in total?

Mr. ALM. From an initiation from an ANPR to go to the next step to an NPR.

Senator DURENBERGER. Is there a field process?

Mr. ALM. Not at that level. The notice of proposed rulemaking then goes through the process Jim Barnes described.

Senator DURENBERGER. That is the one you are going to tell us about for the record?

Mr. BARNES. The two steps that you go through on every rule-making are the proposed rulemaking and then the final action.

Senator DURENBERGER. The proposal would take about a year?

Mr. ALM. The ANPR would only be out for comment about 3 months. The real job then has nothing to do with the process, it has to do with the complexity of the issue. Developing a legally and technically defensible regulation is what takes the time.

Mr. BARNES. I think one thing that we might mention, Mr. Chairman, is that, under RCRA we do have some tank standards under development that would be proposed early in 1985 on underground storage of hazardous waste. I think they would give the Agency a real leg up in terms of standards for various product storage underground. Much of the information, technical information and so on that you would obtain for the hazardous waste underground storage tank standards underground would be utilized.

Senator DURENBERGER. But you got a whole lot of companies out there that have an investment of certain kinds of tank manufacturers, they have an interest you are not moving too quickly. We heard last week from Suffolk County about this double-walled tank, manufactured in Europe and now being sold in the United States, Lloyds of London told us they have practically eliminated

the tank leakage problems in Europe by utilizing this kind of a tank.

Is there some special reason why we ought to wait 3, 4, 5 years?

Mr. ALM. We would hope through the Chemical Advisory and through working with API and SIGMA, the independent dealers association, that we can get the word out. I would agree with you that it is not sensible to put in a bare steel tank at least in areas that are subject to corrosion. It simply doesn't make sense to continue.

Senator DURENBERGER. Out in the desert someplace it probably is not a bad idea.

Mr. ALM. I don't know. That would depend on the conditions. In general we ought to be using more protective kinds of tanks. A number of the major oil companies have got tank replacement programs. It is important in those programs that technically sound tanks be the replacement type and I presume that is indeed the case, that people are not replacing one bare steel tank with another.

Senator DURENBERGER. If you were going to look at this universe and try to scope out a way of solving the problem, wouldn't you want to see a policy for the country that had some kind of notification requirement that the purpose of establishing what the whole tank universe happens to be over some period of time, wouldn't that be a good thing to have?

Mr. ALM. Senator, I am not sure. It is a good thing to have in theory, but unfortunately I have to deal with the reality of managing an agency and I am not sure how usefully we could deal with 2 million pieces of individual information as compared to survey data. Certainly in our own thinking we think that some form of notification when actual leaks occur may well be warranted, but we are not certain that the location of all tanks could be effectively utilized.

Senator DURENBERGER. In terms of preventing problems, a program that included performance standards for new tanks and prohibition on tanks without corrosion protection in most geologic settings, would that not be appropriate?

Mr. ALM. As I indicated in my testimony, that is one of the regulatory options we are focusing on. At this point in time without getting better information, it seems like a good idea. Now, whether any information later would indicate refinements to the system, I don't know. Some people have suggested that you might have required the most sophisticated technology for areas where you expect corrosion and perhaps require less sophisticated tanks in other areas. That might save a lot of money, on the other hand, it may be unenforceable.

Senator DURENBERGER. And a good program would have to have some system of detecting leaks and that would have to be supported in some way by some kind of inventory control or leak detection device or some sort of adequate enforcement program with periodic inspection.

Mr. ALM. My testimony also indicates we are considering as one of the regulatory options a test and inspection procedure with notification and obviously any such system would first of all have to depend on inventory control with a possibility of using tests in

those cases where the inventory controls could not account for all the losses.

Senator DURENBERGER. One of the best ways to limit the involvement by the bureaucratic process is to establish some element of financial responsibility in a program like this would be helpful, would it not?

Mr. ALM. In theory. That is an issue we have not looked into, whether insurers would come in to such a market. If insurers saw a very uncertain market. Obviously anybody can get insurance on anything, but the question is at what price. That is something we have not looked into.

Senator DURENBERGER. Is there any question in your mind but, when we go out, however, we go ahead with a program in this area from a governmental standard, State and local governments are best situated to implement a tank program?

Mr. ALM. There is no doubt about that. We would want to use the capability of State and local governments.

Senator DURENBERGER. I thank you very much. I appreciate your patience and your testimony here today. I am sure we will be back together on this issue and the areas of mutual concern.

Mr. ALM. Thank you.

Senator DURENBERGER. The hearing is adjourned.

[Whereupon, at 3:15 p.m., the subcommittee adjourned, to reconvene subject to the call of the Chair.]